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NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Chemical Plant Developments

WE publish this week a number of contributions bearing upon the design and construction of chemical plant and the general principles of the recently recognised science of chemical engineering, together with descriptive notes on some recent installations and inventions. These include an account of recent improvements in the Stream-Line Filter, showing some fruitful results of the continuous experiment which is being made with this notable machine; a description of a modern superphosphate plant, put up by a British firm, in which a feature is the large-scale mechanical handling apparatus; some notes on the Vickers new continuous rotary pump, which is attracting considerable attention at Wembley; and further notes on the Mills-Packard sulphuric acid plant and the Bornett pressure filter. In addition, a familiar contributor, Mr. G. F. Zimmer, and a recognised authority on the subject, writes on the important question of efficient bulk storage of chemicals in powdered form. Finally, Mr. P. Parrish, who is coming to be recognised as one of our soundest authorities on technology, reviews some chemical engineering problems arising out of the gas industry. He deals particularly with three—the semi-direct process of sulphate of ammonia manufacture, the provision of efficient chemical plant for the production of gas liquor of an economic strength, and certain practical points which have arisen in connection with the production of dry neutral sulphate.

These contributions have little to say directly about the general theory of chemical engineering and the general scope and functions of the chemical engineer. They only introduce theory in so far as it arises in the pursuit of invention or in the design and the installation of plant. But Mr. Parrish gives us one or two suggestive generalisations, and it is something of a coincidence that his article dealing with some outstanding chemical engineering problems should appear almost simultaneously with the publication in *Chemical and Metallurgical Engineering* of an address which our good friend, Mr. H. C. Parmelee, the editor of our American contemporary, recently delivered before one of the sections of the American Chemical Society on very much the same subject. At least it may be said that the occasion provides an interesting and unusual opportunity for drawing comparisons between the stages of development which have been reached in the chemical engineering profession in the two countries, for reviewing the prospects which the profession is likely to afford to those who are attracted to it, and for the ventilation of ideas as to the process, both theoretical and practical, through which the raw recruit must be put in order to assure that he will emerge actually as a chemical enginer and not as some hybrid type such as is likely to be produced by the study of chemistry and of engineering in water-tight compartments. If we have failed until recent years to produce chemical engineers of the type required in chemical industry we must lay the blame primarily, perhaps, upon the fact that our students and apprentices have been taught their science and technology in an isolated fashion. There has, in fact, been too little contact or *liaison* between subjects, and usually the chemical engineer has emerged as an individual who has supplemented his chemistry with a little knowledge of mechanical engineering, or as a mechanical engineer who has read a book on popular chemistry.

As Mr. Parmelee says, however, ideas about chemical engineering and the function of the chemical engineer in industry have become crystallised in recent years. During and since the war experience has impressed upon us the fact that the mechanical methods of applying chemical processes efficiently and economically are always as important as sound chemistry, and frequently more vital to the success of the process from the commercial point of view. One of the outstanding problems with which the chemical engineering profession is faced is that of providing suitable facilities for education and training for those who are to become the chemical engineers of the future. The problem is not easy of solution and it will doubtless be some years before the ideal curriculum is found. Perhaps those

who have the matter in hand could not do better than keep before them an admirable definition which Mr. Parmelee lays down as a starting point. He says that chemical engineering is not a composite of chemistry and mechanical and civil engineering, but is itself a branch of engineering, the basis of which is those unit operations which in their proper sequence and co-ordination constitute a process as conducted on an industrial scale. Herein is expressed a first principle which many have failed, perhaps, to appreciate in its true significance. Once it is recognised, there should be no great difficulty in elaborating the details of a system capable of giving the right kind of training to the right type of mind.

It is interesting to note that both the British and the American writer fix as a final point on the importance of personality. As Mr. Parmelee puts it, personnel is more important than curriculum—" success will be measured not so much by the label that is put on a course of study as by the philosophy underlying its conception and method of presentation." There is a nice variation in the words in which Mr. Parrish states the same idea. " There is an inclination to attach too much importance to labels and too little to the individuality of the man. Whatever one may think of the relative status of the gas engineer, the coking engineer, or the chemical engineer, it is certain that the acid test of the future in all these matters will be—' By their fruits ye shall know them.' "

The Dust Hazard in Industry

THE article which Mr. Rex Furness contributed to our last issue, and in which attention was drawn to the potential source of danger presented by dust clouds, is one well worth the serious attention of all in charge of chemical or other works. Largely owing to the fact that an element of luck seems hitherto to have entered into the question and precluded anything in the way of repeated accidents, we are apt to treat the matter with apathy ; but if consideration is given to the large number of operations in which the explosion hazard is present it will be appreciated that there are few industrial works which are not in some way or other exposed to risk. As an instance of how the unexpected may happen we may quote a works manager who told us only last week of an experience he recently had. For some ten years he has been dealing with fine coal by means of a conveyor which discharges into a closed store. The question of the explosion or fire hazard had never occurred to him until one night he was awoken to be told that his store was partly burned down. At first sight the occurrence was difficult to explain, but it eventually transpired that his particular store was lit by naked flames which had undoubtedly ignited a coal dust cloud. When the store was rebuilt it was fitted with electric light, since when no further trouble has been experienced, although, as has been demonstrated, dust may be directly heated to its ignition temperature by settling on an electric light bulb. The occurrence, however, is a useful reminder of the fact that although some particular set of conditions may give entire immunity from trouble over a long period of years this is in no way a guarantee that the optimum conditions for explosion or fire may not still occur.

Apart from the ignition hazard, one has always to bear in mind that with almost all forms of dust there is also the physiological hazard. A great deal has been done in this country by the Home Office and the Ministry of Health, and in America by the Bureau of Mines and the Public Health Service, to minimise this particular form of hazard, either by removal of the dust at the point of formation, or, where possible, by keeping the work damp and so preventing the formation of dry dust, or again, by introducing the use of gas masks. From both points of view, however, the efficacious treatment of the problem is a matter of considerable importance, and it will interest our readers to know that Dr. W. E. Gibbs, the chief chemist to the Salt Union, Ltd., is contributing a volume on the subject to the *Chemical Engineering Library* published by Ernest Benn, Ltd. Dr. Gibbs has already added very much to our knowledge of the subject with his contribution to the Proceedings of the British Association in 1922 ; and, as he has pointed out, much remains to be done to establish conclusively the precise physical character and chemical behaviour of liquid and solid substances when they are dispersed in a gas. The problem belongs esentially to the domain of colloid chemistry, while related problems are those associated with the combustion of powdered coal and atomised oil. Although most industrial dust is relatively coarse, there is generally a proportion of it which is sufficiently highly dispersed to exhibit active Brownian motion. It is possible, therefore, that this relatively small proportion of highly dispersed dust may, in some circumstances, play an important part in determining the behaviour of the whole cloud.

Fine Chemicals from the B.D.C.

THE new price list issued by the British Dyestuffs Corporation of their fine organic chemicals for research work and of indicators, microscopic stains, and medicinal and photographic chemicals is a reminder of the many by-products which a completely equipped dyestuff industry may yield and of the new uses to which it may be diverted. It is the policy of the Corporation—so a brief foreword explains—to give chemists, biologists, pathologists, etc., facilities for obtaining such organic chemicals as are met with in the manufacture of synthetic dyes. With this end in view, a department has been developed to gather together and purify organic chemicals and to offer them in the finest condition possible to the general research worker. As regards fine chemicals, the products listed do not contain the simple organic reagents, such as acetic acid, the manufacture of which does not arise in the dyestuffs industry. The aim is to offer rather the complex intermediate products which the research worker might find it difficult to obtain elsewhere, together with the simpler substances such as aniline, nitro-benzene, etc., which form the basis of the dysetuffs industry. In addition to microscopic stains in a considerable range, the B.D.C. indicators covers a hydrogen-ion concentration range from 0·0 (Naphthol Yellow S and Picric Acid) to 13·0 (Resorcin Yellow and Titan Yellow). Recent research work has demonstrated that certain dyestuffs have considerable antiseptic action, and were so used during

the War, and it is stated that the B.D.C. were the first producers of Acriflavine in this country. Attention is particularly drawn to Euflavine or neutral Acriflavine, a product officially prepared to meet medical needs. In this product one molecule of hydrochloric acid has been removed but the fundamental part of the molecule is left unchanged. In this way a product is obtained with the same antiseptic properties as Acriflavine but stated by some authorities to be without any irritant action. This and other makers' lists issued from time to time indicate that the fine chemical industry in this country is becoming an important reality.

Although of late but little has been heard about the famous agreement with Germany, the matter is still discussed in chemical circles. "Dead as mutton" was one verdict we heard recently pronounced with confidence. Elsewhere the possibility of a reappearance in a new form is recognised. The one notable result of the discussion is that it has killed the nagging criticism of the Dyestuffs Act by showing that if the present safeguards were withdrawn other steps might be taken which would even more severely restrict the import and free distribution of German dyestuffs. Little, again, has been heard lately of the contemplated reconstruction of the company, but considerable activity has been noted in the £1 seven per cent. non-cumulative preference shares. In 1923 the value varied from 6s. 9d. to 13s. 6d. This year the variation has been from 10s. to 13s. 7½d. The shares, which have risen about 2s. in the past fortnight, are now round about 12s. 3d.

Wembley

RECENT visits to Wembley show that in spite of the dreadful weather the Exhibition is still attracting its thousands of visitors, and there is always a steady flow along the main avenue bounding the Chemical Section and through its numerous by-ways. The greater proportion, no doubt, represent the general public, who look with wonder on what they only dimly understand, but the expert element is always present, and one has never passed through the Science Section without seeing little groups studying with great attention the various stands there. The official date for closing is now approaching, and people are wondering what will happen to the chemical collection. The obvious thing is that the exhibits will disappear in just the same business-like way that they arrived. Even if the Empire Exhibition is reopened in 1925, the exhibitors, it may be assumed, will not contemplate a continuance next year. By October it will probably be felt by all that the Section has served its purpose, and though the expense has been heavy, very few, if any, will regret their public-spirited enterprise or feel it has not been worth while. Though considerable business has been done, the Chemical Section was not organised primarily for booking orders; its aim was essentially educational, both for the public and for the industry, and the results, though not immediate, are pretty sure to appear in due course.

In spite of the months the Exhibition has been open there are constantly coming to view features which have not been made sufficiently known. This week, for example, a pamphlet appears giving an excellent account of the Imperial Institute exhibit in the Government Pavilion—admittedly one of the finest things in the Exhibition. Here the chemical visitor will find much to interest him in connection with the supplies from within the Empire of oils and oil-seeds, rubber, essential oils, resins, tanning materials, drugs, etc. There is, in fact, scarcely a pavilion which does not testify in some way or another to the world-wide range of chemical industry.

Points from Our News Pages

Mr. P. Parrish, whose new book is reviewed in this issue writes on "Some chemical plant problems" arising out of modern gasworks practice (p. 208).

The problems of "Efficient bulk storage of chemicals in powdered form" is dealt with by Mr. G. F. Zimmer (p. 210).

Other contributions relating to chemical plant deal with modern British superphosphate manufacture (p. 212), a new type of rotary pump of considerable interest (p. 214), the latest developments in the Stream-Line Filter (p. 215), the Bornett Pressure Filter (p. 211), and Mills-Packard sulphuric acid chambers (p. 213).

Letters are published from "P. H. Logiston" ("The Born Chemist") and W. R. Fairbrother ("New Income Tax Provisions") (p. 216).

Further notes on French chemical industry developments are published from our Paris correspondent (p. 217).

In our Patent Literature several entries appear in the name of Synthetic Ammonia and Nitrates, Ltd., (p. 221).

Our Market reports indicate signs of improvement in certain branches (p. 224).

Books Received

THE STRUCTURE OF CRYSTALS. By Ralph W. G. Wyckoff. New York: The Chemical Catalog Co., Inc. Pp. 460.

QUANTITATIVE ORGANIC MICROANALYSIS. By Fritz Pregl. Translated by Dr. Ernest Fyleman. London: J. and A. Churchill. Pp. 190.

TRANSACTIONS OF THE INSTITUTION OF CHEMICAL ENGINEERS. Volume I. 1923. London: The Institution of Chemical Engineers, Abbey House, Westminster. Pp. 120.

THE RUBBER MANUFACTURER'S HANDBOOK. By W. Guy Pinkney and P. Watkins. London: "The Rubber Age," 43, Essex Street, Strand, London, W.C.2. Pp. 90. 12s. 6d.

CHARTS OF THE CHEMICAL REACTIONS OF THE COMMON ELEMENTS. By John A. Timm, Ph.D. New York: John Wiley and Sons, Inc. London: Chapman and Hall. Pp. 81. 10s.

ANALYTICAL CHEMISTRY. VOL. II., QUANTITATIVE ANALYSIS. By F. P. Treadwell. Translated by W. T. Hall. Sixth Edition. New York: John Wiley and Sons, Inc. London: Chapman and Hall. Pp. 811. 25s.

The Calendar

Sept 1	Institution of the Rubber Industry. Meeting, 8 p.m.	Engineers' Club, London.
4–5	Iron and Steel Institute Autumn Meeting	British Empire Exhibition, Wembley
8–11	Institute of Metals	London
8–13	Chemists' Exhibition	Manchester
15	Conference of Engineering Societies.	Wembley, 10.30 a.m.
Oct 7	West Yorkshire Metallurgical Society Annual General Meeting, 7.30 p.m.	George Hotel, Huddersfield.
Nov 4	West Yorkshire Metallurgical Society Discussion on "The Influence of Casting Temperatures on the Physical Properties of Non-ferrous Alloys." 7.30 p.m.	George Hotel, Huddersfield.
14	Society of Chemical Industry and Chemical Industry Club: Joint Autumn Dinner	London

A Review of Some Chemical Plant Problems

By P. Parrish, A.I.C., M.I.Chem.E.

Mr. Parrish, whose recently-published book on "The Design and Working of Ammonia Stills" (reviewed on p. 209) has been so favourably received, deals with a number of specific chemical engineering problems which as yet remain only partly solved. He expresses the view that if careful observation is made of the details of the processes, and if they are examined in the light of present-day knowledge, there should be no difficulty in arriving at a stage of practical success.

THAT there are many chemical plant problems awaiting solution none will deny, however much one may be inclined to doubt the existence of, or necessity for, the chemical engineer.

One need only cite one or two typical problems to make it abundantly clear that there is a necessity for a type of man who not only appreciates the intricacies of chemical reactions and physical laws, but who is sufficiently conversant with engineering practice, the properties and characteristics of materials of construction, and works manufacturing operations to be able to design (and subsequently work efficiently) the type of plant which will give a desired result in the simplest and most direct way.

In your contemporary, the *Gas World*, it was recently suggested that gas and coking engineers have to be a good deal more than chemical engineers.

Without entering into a discussion of the merits and justification, or otherwise, of this statement, it will be well to examine one or two typical problems involving plant which is not unidentified with gasworks and coke-oven operations.

Semi-direct Process of Sulphate Manufacture

There are not a few instances where the installation of the semi-direct process of sulphate of ammonia manufacture can be abundantly justified. At those gasworks where difficulty is experienced in the disposal of the effluent spent liquor, a material contribution to the solution of the problem can be found in the adoption of a semi-direct sulphate of ammonia plant.

Several installations of this character have been erected, but it is known that the results have not fulfilled anticipations. Indeed, so indifferent has been the operation of these plants, creating additional difficulties at other parts of the works, that it became necessary a short time ago for the late Chief Alkali Inspector to investigate the kinetics of the process in the hope of affording relief to those gas engineers who were undoubtedly confronted with a genuine difficulty.

Apart from the inexplicably low yield of sulphate of ammonia per ton of coal carbonised, difficulty was experienced in the working of the oxide of iron purifiers. Analyses showed that the oxide of iron in the first box was invariably in an acid or "sour" condition, that the operation of the purifiers was erratic, and that the losses of ammonia were obscure. But it should have occurred to the plant manufacturers, and not less so to those who were working the plant, that it is impossible to pass crude coal gas at a given velocity through an absorber partly filled with acid-containing sulphate of ammonia liquid without causing entrainment of the acid-containing liquid.

Moreover, as the next section of plant through which the gas had to pass was one containing oxide of iron (an admirable filtering medium, as one knows by the amount of vesicular tar which is arrested by this material), careful consideration must have disclosed the fact that the acid-containing sulphate of ammonia liquid entrained by the gas must react with the oxide of iron, forming sulphates, which would definitely prevent the purifying material from functioning in the manner intended. Thus, not only was a very large portion of the purification plant being rendered *hors de combat*, but there was a distinct loss of sulphate of ammonia at this stage of the process. To aggravate matters, at many works it was conceived that the difficulty of souring could be overcome by by-passing the absorber. Ammonia, therefore, reached the purifiers, and hence a cycle of chemical reactions was set up in the first purifier quite foreign to what was intended. The acid-containing ammonium sulphate liquid entrained by the gas reacted with the oxide of iron, forming ferrous sulphate and ammonium sulphate. Then, as a result of by-passing the absorber, crude coal gas containing ammonia, hydrogen sulphide, etc., reached the purifier in question. The ferrous sulphate was eventually converted into ferrous sulphide, and thereafter any unchanged oxide of iron was rendered alkaline, when absorption of the hydrogen sulphide proceeded apace. But, curiously enough, no sooner was this state of affairs established than the by-passing of the absorber was discontinued, and crude coal gas was sent forward containing vesicular acid-containing sulphate of ammonia, with the inevitable accompaniment of the phenomenon of souring.

With the knowledge of these facts, which careful observation and other evidence at the plant should have revealed, it seems difficult to imagine that the necessity for the modification of the plant did not make itself evident.

There is good reason to believe that (*a*) with a modified design of absorber, arranged in such a way as to obviate stratification and to afford better contact between the gas and absorbing medium, having an anti-entrainment device, and (*b*) with provision for the passage of the gas through a suitable sized washer containing an alkaline liquid, the semi-direct process of sulphate of ammonia manufacture at gasworks could be operated successfully, and without the unfortunate difficulties which have been such a marked feature of the working of these plants hitherto. The modifications foreshadowed do not entail much extra capital expenditure, nor, indeed, do they involve any perceptible increase in the cost of operation, but they are calculated to result in a material increase of sulphate of ammonia recovered per ton of coal carbonised.

Gas Liquor of Economic Strength

There is another allied problem affecting many gasworks, and not a few coke ovens, which similarly awaits solution. This is the provision of efficient chemical plant for the production of gas liquor of an economic strength.

What is an economic strength? Dr. E. W. Smith, speaking on this subject at the conference of the Chemical Engineering Group of the Society of Chemical Industry in Glasgow in July, 1922, said: ". . . it was obvious that any gas undertaking that did not employ an acid catch for its ammonia extraction prior to the purifiers was wasting money and energy. If they considered that most gasworks supplied liquor of perhaps 8 oz., it would be quite an easy thing to produce a liquor of 15 oz. to 16 oz. with an acid catch, and in that way eliminate at least one-third of the ammonia scrubbers. It would be a good thing to the distiller of liquor if that large amount of water could be eliminated. . . ."

Despite this observation two years have elapsed, and next to nothing has been done by the gas and coking industries in this direction. That Dr. Smith's dictum is sound hardly needs demonstration. The subjoined table, reproduced from the writer's recent book on "The Design and Working of Ammonia Stills," supplies the necessary figures relating to the problem of the economic production of gas liquor:

STEAM AND GAS LIQUOR REQUIRED PER TON OF SULPHATE OF AMMONIA (25·5 PER CENT NH_3), MADE WITH VARYING STRENGTHS OF GAS LIQUOR.

Per cent. NH_3 in feed liquor.	Lb. NH_3 per ton sulphate of ammonia (25·5 per cent. NH_3).	Tons liquor per ton of sulphate of ammonia (25·5 per cent. NH_3).	Lb. steam required per ton of sulphate of ammonia (25·5 per cent. NH_3).	Tons steam required per ton of sulphate of ammonia (25·5 per cent. NH_3).	Per cent. steam on gas liquor distilled
1·0	571·2	25·50	6,438	2·88	11·6
1·5	571·2	17·00	4,162	1·85	10·9
2·0	571·2	12·75	2,963	1·32	10·4
2·5	571·2	10·20	2,423	1·08	10·5
3·0	571·2	8·50	2,031	0·91	10·7
3·5	571·2	7·28	1,742	0·78	10·7
4·0	571·2	6·38	1,581	0·71	11·1

If the gas and coking industries are to consolidate their position, so as to be able to face the situation which the introduction of synthetic ammonium compounds on the market will inevitably create, it is certain that consideration of this aspect cannot be neglected much longer.

It is seen from the above table that the relative quantities of gas liquor of 1·5 per cent NH_3 (about 7 oz.) and 3·5 per cent. NH_3 (about 16 oz.) to produce one ton of sulphate of ammonia of 25·5 per cent. NH_3 are 17 and 7·28 tons, and that the relative consumptions of steam are 4,162 lb. and 1,742 lb. respectively. In other words, basing on steam at 5s. per ton, there is a saving by using the higher strength liquor, in this item alone, of 5s. 5d. per ton on sulphate, quite apart from the economy of steam in pumping, the substantial reduction in cost of carriage or lighterage of the liquor, and the saving in the matter of labour.

There is no insuperable difficulty in the design of an efficient acid catch apparatus to enable gasworks and coke ovens to produce gas liquor of 16 oz. strength. The essential considerations are these :

(*a*) The size of the ammonia scrubbers can certainly be curtailed ;

(*b*) The acid catch apparatus for arresting the remaining ammonia should not throw too much back pressure, but it should be of such a size as to reduce entrainment to a minimum, and neutralisation of the acid by the ammonia should not proceed to such a degree that difficulties are created by reason of the separation of ammonium sulphate; and

(*c*) An efficient alkali washer should be provided at the outlet of the acid catch apparatus to ensure that the gas entering the purifiers is alkaline.

But the plant problems which have just been disclosed merely concern one unit process—absorption—as applied to one industry—the coal distillation industry. When one considers that there are at least fifty unit processes, and that these affect a large number of distinct industries, and that in all these unit processes there are plant problems demanding solution, one begins to realise the scope which exists for the application of the principles of chemical science and creative development.

The Production of Dry Neutral Sulphate

Space will only admit of the mention of one other unit process relating to the coal distillation industry where improved chemical plant is needed, although it would not be a difficult matter to cite a dozen other interesting chemical plant problems.

The introduction of methods for the production of dry neutral sulphate of ammonia has brought with it its peculiar problems. The freeing of the crystals of sulphate from the adhering acid mother liquor may be contrasted with filtration under pressure. The shell of the basket is a filtering medium of a sufficiently fine texture to retain the crystals, while admitting of the passage of the liquor. The centrifugal force creates a pressure in the direction of the periphery throughout the bed in the rotating basket. The extent to which the salt is dried depends on the centrifugal force developed, on the size and uniformity of the crystals, on the absence of colloidal matter, and on the degree to which the particles absorb or retain liquid.

The greater the ratio of crystal surface to crystal mass, the greater the rapidity of drying; but this is not all. The efficiency of any neutralisation process which involves the use of an alkaline washing medium is predetermined by the size of the crystals ejected, or fished, from the saturator. This was an aspect developed by the writer in an article appearing in THE CHEMICAL AGE of January 28, 1922.

But another problem arises. It can hardly be expected that a piece of chemical plant—a centrifuge—intended to deal essentially with an acid-containing magma will answer satisfactorily when an alkaline washing medium is alternately introduced. The application of an acid-containing magma is a sufficiently severe test for any chemical machine, but to count on reasonable life when the latter operation is immediately succeeded by the use of an alkaline liquid is to expect too much.

It is true that by the use of a steel gauze placed inside the basket, by the sheathing of the phosphor bronze spindle, and by the reversal (top for bottom) from time to time of the copper sheets of the basket, increased life can be secured, but these are merely expedients, and it is certain that a new type of plant or a more suitable metal for construction is called for. Whether a rotary type of filter, specially constructed with a Monel metal drum, will meet the stringent requirements remains to be seen. All that can be affirmed is that here is a chemical plant problem of first importance demanding solution.

Finally, it may be said concerning the thesis around which this article has been woven that there is an inclination to attach too much importance to labels, and too little to the individuality of the man. Whatever one may think of the relative status of the gas engineer, the coking engineer, or the chemical engineer, it is certain that the acid test of the future in all these matters will be the biblical one, "*By their fruits ye shall know them.*"

Mr. Parrish's New Book

DESIGN AND WORKING OF AMMONIA STILLS. By P. Parrish. London : Ernest Benn, Ltd. Pp. 300. 40s.

The subject of distillation is too often regarded from the narrow aspect of the still and its immediate accessories only, whereas in a great many cases it is intimately connected with and dependent on a variety of outside circumstances which vary according to the nature of the operation. Mr. Parrish, in writing the above book, has clearly had in mind this distinction, and while he has given chief attention to the design and working of ammonia stills he has recognised the very great importance of outside considerations. The chapters on the production of steam from breeze, the treatment of waste gases and effluent liquor, and the disposal of the sludge resulting from the distillation processes are important corollaries and have received adequate attention.

The treatment of the main portion of the book which deals with the stills used in the distillation of ammonia from gas works liquor is very thorough and complete. An examination of the present-day operations and designs has led the author to conclude that in many ways quite considerable improvements in design and economy in operation are possible, and he has supported his arguments with pertinent small and large scale experimental work. This is one of the most valuable parts of the book and demands the most careful consideration, not only by the manufacturers and users of ammonia stills but by those interested in distillation in general. There is in distillation work a wide gulf between theory and practice, and Mr. Parrish has wisely not attempted to bridge this gulf by giving a design based on theoretical considerations. The consideration of distillation from the thermal aspect is highly instructive and clearly expressed. Treatment of this kind could profitably be extended to many other distillation processes.

Mild criticism may be directed to the author's assumption that every reader is familiar with the type of plant and general operations in the distillation of ammoniacal liquor. An expansion of page 51 and an explanation of the process with a simple illustration would be of assistance to the general reader. In some other small respects a few words of explanation would be useful.

The paper and printing are all that could be desired and typographical errors are almost entirely absent. This book is a highly important contribution to the literature on distillation, and is of peculiar value in that it gives information of a useful and practical nature.

C. ELLIOTT.

The Future of Chemical Warfare

A REPORT on the dangers of chemical warfare has been drawn up by the League of Nations Sub-Committee appointed by the Temporary Mixed Commission for the Reduction of Armaments. The report concludes that while poison gas is still a real danger, the risk of wholesale slaughter by means of microbes is not likely in the near future. On the other hand, expert opinion on poison gases is that they remain a terrible menace. At the outbreak of war thirty poison gases were known ; this number has now increased to a thousand, although among the many new discoveries there is not one more deadly than the thirty known in 1914. The report divides poison gases into three classes : irritants, such as mustard gas ; asphyxiants, such as chlorine ; and poisons, such as carbon monoxide.

Professor André Mayer, of the Collège de France, writing in the report, says : "Chemical warfare gives an immense superiority to any Power with hostile intentions. An injurious substance, studied in secret (and this study can be carried on anywhere), manufactured in large quantities (and this manufacture can be carried out in any chemical works), and launched unexpectedly against any unprepared population, can completely destroy every shadow of resistance."

Efficient Bulk Storage of Chemicals in Powdered Form

By George Frederick Zimmer, A.M.Inst.C.E.

In the article below a method is described of getting over the difficulty of handling materials which tend to form cakes or lumps during storage.

In the manufacture and sale of powdered or semi-powdered substances it is not always desirable to draw them off, as manufactured into cartons or tins; it is, therefore, often necessary to accumulate such products in overhead receptacles, from which they can be withdrawn at intervals for sale, or for the purpose of being mixed with other substances. The majority of such powders have a tendency, when stored as stated in bulk, of adhering together in lumps, or even in one solid mass. If this be the case it is extremely difficult to get such material to flow out of receptacles when the outlet slide or gate is opened. Most manufacturers in the chemical industry will have had this unpleasant experience. The commonest methods adopted in order to get a move on are to hit the hopper or to poke a rod or stick into the aperture. Either method is unsatisfactory on account of the damage done to the hopper, the expense of the manual labour involved, and the impossibility of obtaining a continuous supply of a uniform and homogeneous product. The material, if it can be induced to leave the outlet by these means, appears in lumps, which not infrequently have to be broken up on rollers or by a detaching device.

A method which successfully solves all the difficulties enumerated—and which forms the subject of this article—has been employed for a number of years in flour mills, where it withdraws the flour from bunkers absolutely without hitch and in any quantity desired. Since the physical nature of flour resembles that of quite a number of chemical products, the writer has no doubt that the same device can be employed in quite a number of cases in the chemical industry. The device under notice is known as the Redler Bin Discharger.

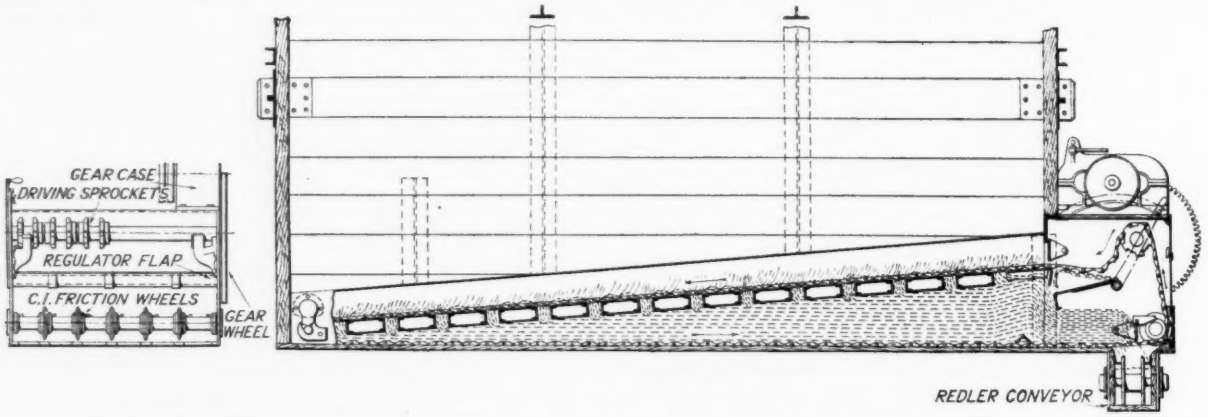
Difficulties with Coarse Material

It is a well-known fact that it is most difficult to get very fine and very coarse material to run out through the delivery gate in an uninterrupted stream, while granular and intermediate size bulk will run out almost like water and is, therefore, under perfect control. The phenomenon is due to the fact that such overhead receptacles are generally contracted, funnel-like, at the base, in consequence of which all the material seeks to crowd towards the outlet and in doing so hangs up or bridges over. To construct a storage receptacle of a cylindrical or rectangular cross section throughout, without hoppering, would overcome the difficulty, but then the outlet would be so large that it could not be controlled by a slide or gate. In fact, such a gate would itself, by obstructing the outlet, practically act very similarly to a hoppered bunker. Redler's solution is a device which collects the material from the whole bin area in extemely small quantities, which aggregate to the quantity required in a given time unit, which can, with ease, be diminished or increased at will.

The base of such a receptacle is formed of six conveyors which constitute a slowly moving platform or floor of the bin, which removes the material, in the way yet to be described, to the delivery point in such a manner that the contents descend uniformly over the whole area, retaining the upper surface level, as with a liquid. It obviously follows that with such a device, the material first dropped into the bunker is taken out first, and *vice versa*, and not as in the case of hoppered bunkers, where that deposited last will find its way out first, and that which has been in the hopper longest will avalanche down when the hopper is nearly empty. Therefore, if the material handled has a tendency to deteriorate by keeping, the employment of the system here described will prevent this by removing it in the same rotation as that in which it has been deposited.

Dimensions of the Receptacle

Such a storage receptacle consists of a wooden flat-bottomed rectangular chamber, in which both front and sides are perpendicular and parallel from top to base. From back to front it measures 15 ft. overall and its overall width is in multiples of 4 ft. 3 ins. The height is determined by the specific gravity of the material, and a load of 1 ton per sq. ft. on the bin base should not be exceeded, but any heigh up to that maximum may be adopted. In front of such an erection and close to the floor, an opening is left as wide as the bin, say 4 ft. and 2 ft. in height. The mechanical discharging apparatus is inserted through this opening, forming as it were a false bottom, which begins at the back about 2 ins. above floor level and finishes at the front about 15 ins. above the floor. This mechanical part projects beyond the bin in front for about 2 ft. 6 ins. and contains the speed reduction gear, the main drive, and the regulator.



THE REDLER CONVEYOR, ILLUSTRATING THE STRATA OF SUBSTANCES AS ABSTRACTED FROM THE BIN.

The drawing herewith represents a cross section through such a bin unit of the standard size. It will be seen from this how the false bottom is inserted as described. The mechanical part is self-contained, and consists essentially of two mild steel plates of triangular form and half-an-inch thick, set upright. These two plates are connected transversely by 14 small box girders which form an intermittent inclined false bottom. Each of these box girders is constructed of two small steel channels with a plate riveted to top and bottom; between each pair of girders is an aperture, through which the material gains access from the bin to the triangular space beneath the false bottom. Six openwork endless chains, composed of drop forged links, cover the whole area of the false bottom, and these travel very slowly towards the back, where they negotiate one common terminal, from which they return to the front along the bin bottom, where they pass a second similar terminal, whence they ascend over the main drive sprockets and join

up to the upper run. The conveyor run above the false bottom, on which the whole of the weight of the bin contents rests, thus acts as a detacher, while the return run, along the bin bottom, acts as a collector for the liberated material.

The *modus operandi* is as follows :—The upper runs of the six chains are in constant contact with the lower surface of the bin contents, and in their backward travel detach a small portion of the material over the whole area, which drops through the apertures between the box girders.

A Process of Stratification

If we now begin at the back, in order to show the simple process more clearly, what drops through the last and lowest aperture is carried slowly by the lower run of the chains towards the front. This material fills the interstices between the chain links and thus forms the first stratum of the material reclaimed. This constitutes, so to speak, an improvised band, upon which succeeding strata may rest. What drops, similarly, through the second aperture, rests on top of the first stratum and forms the second, and so on, so that at the front and delivery end 15 strata leave the bin at its front extension, but before doing so, an A-shaped weir which passes across the lower chains has to be negotiated, while an upper regulating flap is lowered to—as it were—concentrate the flow, and a bottom scraper prevents the material from following the chains to the front terminal. Thus the material drops through the discharge opening which is, naturally, as long as the bin is wide.

A Redler conveyor of similar construction to one of the six conveyor units, but running at a speed of 60 ft. per minute, carries the material to its destination, as shown on the drawing. A unique feature of this conveyor is that the open link chain which runs in the bottom of a wooden box can carry a load equal to the depth of the conveyor box right up the return run of the chain, which is guided by two small angle bars near the top of the box.

It will thus be understood that the quantity withdrawn at the normal speed of running consists of a stream about 15 ins. thick and 4 ft. wide, accumulated in equal proportions in 15 strata from all parts of the bin. This quantum is, however, under perfect control, and for one bin unit from 1 to 15 tons per hour of a material such as flour or other substance of the same nature and specific gravity may be handled.

If larger quantities have to be dealt with than can be handled with a unit such as described, the installation can be duplicated indefinitely. For instance, a bin composed of two units would be 15 ft. over all one way and 8 ft. 6 ins. the other, which would give an area of about 127 sq. ft., and without exceeding the maximum weight, 127 tons or over 2,000 sacks of a material such as flour could be accommodated in it.

The power consumption for one unit is only a fraction of 1 h.p.

Concerning the chains employed in these installations, they have a pitch of 4 ins., and the cross-bars are ⅜ in. thick. As already mentioned, the links in the bin are of drop forgings and, therefore, of greater strength ; those used for conveyors for the reclaimed material are malleable castings.

The Bornett Pressure Filter

Suitable for Corrosive and Volatile Liquors

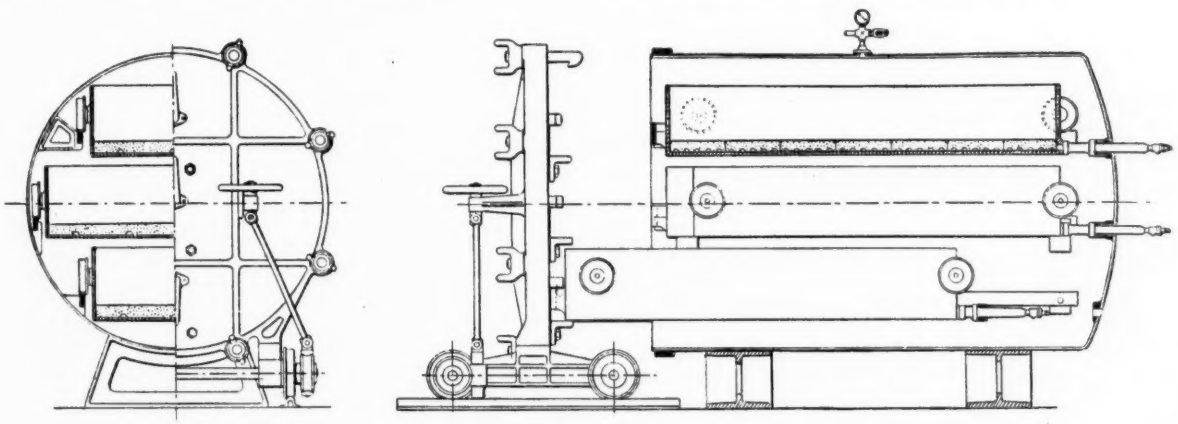
A WELL-KNOWN, but none the less interesting, form of pressure filter, suitable for handling acid, volatile or caustic liquors, is that made by S. Bornett and Co., of 7 and 8, Idol Lane, London, E.C.3. The filtering material is a plate of porous acid-resisting material, and this is available for filtering very fine precipitates under pressures up to 60 lb. When acid liquors have to be filtered under pressure, the first difficulty is the weakness of the materials suitable for use in contact with acids, viz., lead, stoneware or wood. The way in which this is overcome is clearly shown in the sectional drawings. The apparatus consists of a cylindrical steel shell, containing one or more (in the present case three) shallow filter trays running on rails fixed to the casing. Each tray is provided at the back end with a filtrate outlet projecting through the end of the shell, and made air tight against the latter by a heavy rubber collar. The front end of each tray is fitted with an eye, which engages with a hook passing through a stuffing box in the front cover, and bearing on the outside a handle, which at the same time indicates the position of the hook. Each tray may be separately hooked to the front cover and drawn out with it. The bottom of each tray is completely covered with porous filter plates, which are luted against one another and the sides of the tray by some suitable cement, such as waterglass-asbestos, brimstone and graphite, or gas pitch for acids, while Portland cement forms an excellent lute for alkali.

Filtration is effected by compressed air. It is obvious that, the trays being entirely surrounded by this, there is no deforming stress, and materials like stoneware or wood may be used for the trays, which alone come into contact with the sludge under treatment.

Method of Operation

The method of working in the case of a sludge containing a very large amount of solid matter forming a very dense cake is as follows :—The eight hook bolts tightening the front cover are slackened and quickly disengaged from the rim of the shell, for which purpose the holes in the lugs on the cover are oval. The trays are then hooked to the front cover, and the latter is drawn out about a foot ; owing to the shape given to the centre tray, all three are then sufficiently accessible for running in the sludge by means of a hose or gutter. While the trays are full they are returned into the casing, the cover is tightened, compressed air is admitted, and filtration immediately proceeds, the filters being bright from the start. When filtration is complete, on any tray, air will escape and the valve is closed until all are ready. The compressed air is then blown off, and wash water is run on the cakes, which are then allowed to drain off. It is also possible to operate the filter continuously, without opening the apparatus.

The number of filter trays to be used is dependent on the ratio of solid to liquid and the thickness of the cake obtainable. When the sludge contains a good deal of solid which forms a thick cake one deep tray is frequently used.



SIDE AND END ELEVATION OF BORNETT PRESSURE FILTER WITH THREE TRAYS.

A Modern British Superphosphate Plant

Factory Equipped with Mechanical Handling Devices

THE remodelling of fertiliser factories to bring them up to present-day requirements is often a difficult problem to accomplish, especially where they have outgrown their capacity. The buildings which were suitable for the old method of hand labour are often useless in the present state of mechanical production. Probably in the days when they were first started the consideration of the site was not so vital.

GENERAL VIEW OF THE WORKS.

The conveyance of raw materials to the factory was not a difficult matter on account of the quantities not being so large. Competition was not so keen as to make it necessary to study closely the carriage factor. Ground space for storage, etc., was not required to be so large, and the factory at the time would not be surrounded with buildings.

The great advance made in fertiliser factories is shown in a typical example of an up-to-date fertiliser plant worked by electric power designed by W. J. Fraser and Co., Ltd., Dagenham, Essex, for an ultimate output of about 200,000 tons per annum, but at present worked to about 100,000 yearly.

Selection of a Suitable Site

The site selected for the plant was near a deep dock with good railway communication. The raw phosphate is brought up to the quay in the ships, unloaded by electric grabs into railway trucks, and shunted on an overhead railway in hopper

INTERIOR OF PHOSPHATE ROCK STORE.

bottom trucks, directly over the phosphate stores. These stores have a capacity of about 8,000 tons of rock phosphate, and have branch lines running into them, so that the phosphate can be deposited in parallel lines. The rock phosphate stores are fitted up with electric overhead runway grabs, and the phosphate rock is lifted direct from the store and delivered into the hopper feeding the crushers of the grinding plant. The grinding plant is designed in duplicate, and consists of crushers for crushing the large pieces of rock, two grinding mills, each having a capacity of about 12 tons per hour, to grind the rock to required fineness, with screens, elevators, conveyors, and fine meal bins. From this it will be seen that the rock from the time it leaves the ship until it reaches the storage sheds is handled entirely mechanically, and the only labour required is the man looking after the electric transportation of the rock and attending to the mills. The whole of the grinding plant is draughted by means of fans and ducts to collect the dust and deposit it where required.

From the fine meal bin, which has a capacity of about 400 tons, the fine meal is elevated to overhead bins, and automatically passes along conveyors to the mixing plant, the difficulty of the erratic flow of fine meal having been successfully overcome.

The Mixing Plant

The mixing plant consists of two special vertical mixers with acid charge tanks and weighing machines for dry phos-

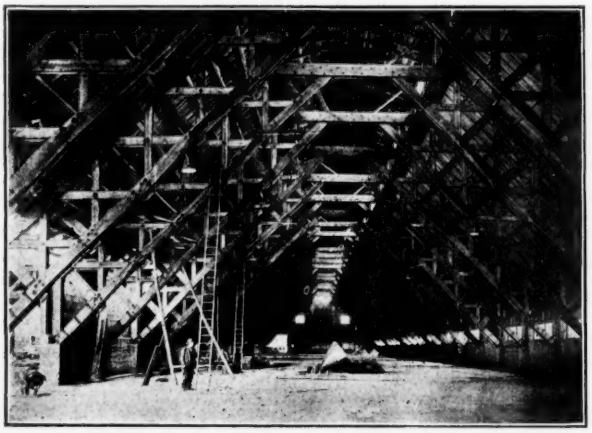
MILLS-PACKARD SULPHURIC ACID PLANT

phate, which discharge their load into four mechanical dens of the type manufactured by W. J. Fraser and Co. The fine meal is brought through conveyors to the weighing machines, and the overplus, if there should be any, due from one cause or another, is automatically returned to the bins. The acid, which has been brought to its required temperature and gravity, is run from the storage tanks through charge tanks and thence to the mixers, together with the phosphate meal. By this arrangement a cylinder of 30 tons capacity can be charged up in one hour. After the cylinder has been filled up the doors are removed and the material excavated by means of revolving knives, which deliver the material cut in a very fine state of division. The cylinders are connected to the gas scrubbers by means of fans and an air duct, which draw away the gas and steam, and deliver it to the wash towers for the condensation of hydrofluoric acid and gas.

The question of corrosion, which is always in evidence in fertiliser works, has been successfully tackled by making the plant of heavy construction in the cheaper metals.

As the material is excavated from the cylinders it falls through on to travelling conveyors, which convey it up into the roof of the storage shed of the superphosphate store. Here it is tipped into tray conveyors, which carry it along the roof

of the shed and deliver it at any required point in the length of the shed. These sheds are some 400 ft. long, and have a capacity of about 20,000 tons of superphosphate. By this arrangement the material, from the time it leaves the fine meal bin until it is delivered to the storage sheds, is not in any way man-handled, which is of great advantage, as the material is kept in a loose condition all the time, and the moisture is allowed to pass away.



INTERIOR OF SUPERPHOSPHATE STORE.

The temperature in the cylinders is about 300° F., which temperature is used as far as possible in the evaporation of the moisture, and under varying circumstances is probably reduced to about 100° F. by the time it reaches the heap.

At the far end of the sheds, bagging and screening machines are fitted, to which the material is conveyed by means of portable excavators or conveyors, where it is screened, bagged and automatically weighed in its sacks, which are loaded by means of a conveyor on to the electric trolleys or railway trucks for dispatch. A branch of this storage is fitted with mixing and blending plant, by which the superphosphate can be blended with other chemicals to form the compound manure. This plant consists of weighing machine, disintegrator, manure mixer and bagging and screening machines, with their conveyors.

The power plant to drive the factory is fitted up in a separate building, and consists of a 400 b.h.p. suction gas engine with dynamos and motors, and also a small 100 h.p. unit for taking the night load when the whole plant is not required to run.

Sulphuric acid is produced for this factory by the well-known Mills-Packard plant, which is working most efficiently with low nitre consumption. There is low chamber space, and supervision and depreciation are brought down to the least possible cost. This plant consists of revolving furnaces for the burning of the sulphur, Glover and Gay-Lussac towers of latest design, six conical water cooled towers each 48 ft. high and 28 ft. diam. at base, and fitted with water sprays, the draughting being carried out by means of fans.

Mills-Packard Sulphuric Acid Chambers

[FROM A CORRESPONDENT.]

THE first Mills-Packard patent water-cooled sulphuric acid chambers were erected some ten years ago, when an experimental plant replaced two rectangular chambers, having a capacity of 78,120 c. ft., and dealt with the same amount of sulphur with a total capacity of 14,660 c. ft. These two experimental chambers worked as a complete unit at the then unheard-of figure of 3 cu. ft. per lb. of sulphur charged. This result was accomplished without the use of contact towers. Since the war the development of the Mills-Packard plant has been very progressive, and important installations are now working in various parts of the world, including England, France, Belgium, Spain, Africa, Morocco, Italy and New Zealand.

The chamber is usually formed in the shape of the frustum of a cone. A strong steel framework supports the chamber lead in such a manner as to leave 9 in. clearance, thereby obviating any danger of corrosion of the framework in the case of leakage. Chambers are also erected in reinforced concrete or wood, but the lead straps are always carried on steel tubes in the manner usual with steel framework. An important feature is the external water-cooling. The water is fed over the chamber ceiling, and flowing down the curtain or wall of the chamber is collected at intervals (at each line of strapping) and redistributed by means of the serrated lead gutters. Uniform distribution of the water is obtained, ensuring the whole surface of the chamber being properly cooled.

Among the advantages claimed for the Mills-Packard Chambers by the owners of the patent, Messrs. Packards and James Fison (Thetford), Ltd., of Ipswich, are the following: The chamber space required per unit of sulphur burned is reduced to less than one-third of the usual space required; the reduction in cost of chamber construction is from 25 to 30 per cent; there is a substantial saving in ground space per unit of production capacity; the lead chambers give longer life; no building is usually required for housing chambers; and it is possible to combine one or more Mills-Packard chambers with the rectangular chambers of existing plants, or with tower systems, to increase production capacity at small construction cost.

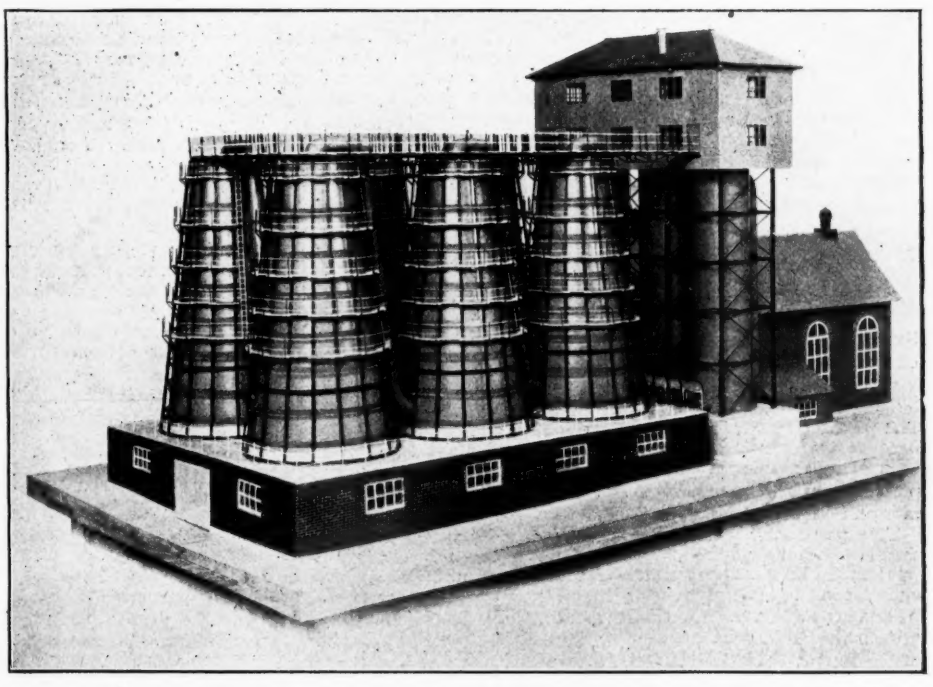


ILLUSTRATION OF MODEL OF A MILLS-PACKARD PATENT SULPHURIC ACID PLANT EXHIBITED BY W. J. FRASER & CO., LTD., AT THE BRITISH EMPIRE EXHIBITION.

A New Type of Continuous Rotary Pump

An Interesting Design Introduced by Vickers

OCCASIONALLY in the history of engineering some device is perfected which stands out from the ordinary run of such things by reason of its ingenuity and originality, and the "Pavic" pump, recently perfected by Vickers, Ltd., is undoubtedly in this class. Briefly, this is a continuous positive rotary pump capable of handling liquids of any degree of viscosity or containing solids in suspension, and with a virtually unlimited lift. It is of extremely small size, and as it contains no springs or valves liable to corrosion it is peculiarly suitable for use with acids or other chemical liquids, especially as the three moving parts of which it consists are simple in nature and capable of manufacture in non-corrosive alloys.

The principle of the pump is worth close study, and to understand its working it is necessary to go back to fundamentals. Firstly, let us consider a hollow cylinder, containing within it a solid cylinder of the same length but having an external diameter just half that of the internal diameter of the hollow cylinder (Fig. 1.) Now, if the solid cylinder is allowed to roll freely inside the other it will make two complete revolutions on its own axis in completing the circuit of the other cylinder. Now, if a screw thread, of pitch l, be cut on the solid cylinder, and it is allowed to roll as before, when a circuit has been completed the position will obviously be identical with that at the start. The thread is only in contact with the outer cylinder at points along the rolling edge, and consideration will show that a groove may be cut in the outer cylinder for this screw thread to run in, and yet it will not interfere with the free rolling movement of the inner cylinder. The pitch of the thread cut on the hollow cylinder will be $2l$ because two revolutions of the small cylinder are made in each complete circuit. It is important to realise that with properly cut threads there is no "screwing" or translatory motion of the solid cylinder.

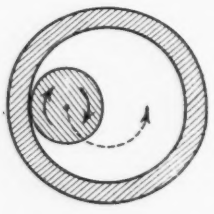


FIG. 1.

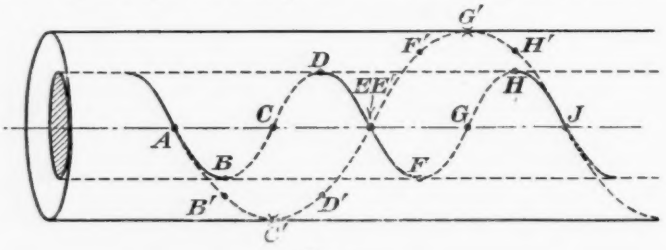


FIG. 2.

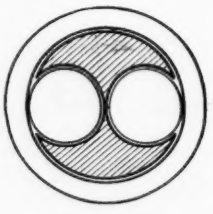
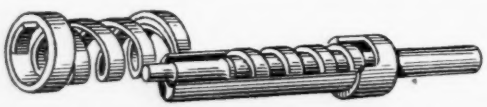


FIG. 3.



SKETCH OF DEMONSTRATION MODEL OF "PAVIC" PUMP (PART CUT AWAY). To be seen at the British Empire Exhibition.

This point may perhaps be made clearer by reconsidering the smooth hollow cylinder and solid roller (Fig. 1). If these were made in glass and a line were traced round the solid cylinder in the form of a screw thread the appearance would be similar to Fig. 2. Considering, first, the point of contact at A, as the inner cylinder rolls downwards, this point of contact of the line will trace out a spiral along the side of the hollow cylinder. When the roller has completed a quarter of a revolution on its own axis, the points BB_1 will be in contact. Similarly with CC_1, for the half revolution, and so on, tracing out a spiral of pitch $2l$. When the roller has completed its circuit the points of contact of the threads are once more A and J.

It may also be noted that translatory motion is produced with screw threads only when there is relative movement between the two engaging threads. Since in the pump the threads are in contact only along the rolling edge of the cylinder, and as in simple rolling there is no relative motion at the rolling edge, there is thus no translatory motion either.

Now at the points of contact of the worm cut on the inner cylinder with the wall of the outer cylinder the groove is entirely blocked because the threads are cut square. Since these points of contact travel along the groove as the cylinder rolls, any liquid trapped between two points of contact will be positively conveyed round the threads, thus the points of contact are virtually pistons moving it along. The inner cylinder is, therefore, named the rotary piston, and in the actual pump there are two of these, and two threads cut in the barrel. The rolling motion of the rotary pistons is given by an axle shaft of the requisite shape (Fig. 3), which closely fits in the barrel, and is rotated by an external source of power. The actual length of the barrel is about 8 in., and the diameter about 2 in., yet the capacity is 12 to 15 gallons per minute, at a speed of 3,000 r.p.m. The liquid, of course, enters at one end and is driven out at the other.

Clearly a pump working on these lines will have certain definite advantages of simplicity, efficiency and economy. The "Pavic" pump has been fully developed and tested, and the makers claim that its characteristics relative to volumetric efficiency and power absorbed show it to be unequalled in comparison with any other type of centrifugal, rotary, or displacement pump. By its construction, the pump will handle oily, gritty, muddy or impure water without injury, and is consequently invaluable for mine or well pumping purposes.

The "Pavic" pump is reversible in action, and can, therefore, be used as a prime mover for driving the pumping unit. This combination can be operated by hydraulic or pneumatic pressure, thus overcoming any difficulties due to the use of electric motors, and providing a safe, efficient and economical prime mover in workings where electric motors are unsuitable, due to the danger of fire, explosion or flooding. It is particularly to be noted that discharge heads up to and exceeding 3,000 ft. can be obtained from a single unit, thus entirely eliminating the multi-stages of the ordinary centrifugal pump. Finally, the "Pavic" pump can be direct-coupled to steam, electric, pneumatic or hydraulic prime movers, and may be operated at high speeds in either a horizontal or vertical position.

Vulcanite Chemical Plant

THAT vulcanite is receiving increased attention from chemical manufacturers is shown by the latest catalogue issued by David Moseley and Sons, Ltd., of Ardwick, Manchester. Although principally devoted to indiarubber goods the catalogue has a special section illustrating various kinds of vulcanite plant. On account of its acid-resisting properties and its lightness and easy manipulation vulcanite is gradually finding a place in chemical and textile works. One illustration shows a large stack of vulcanite pipes recently completed by the firm for a 300 ft. length to convey supplies of pulp. These pipes are made in various sizes with flanged joints, and in the absence of excessive heat the use of vulcanite effects considerable saving over the heavy metals, as well as being acid-resisting and non-corrosive. Vulcanite pumps for acids, bleaching fluids, dyes, vinegar, etc., are shown together with laboratory apparatus. The firm emphasise their ability to give expert advice as to the uses for which vulcanite plant is most suitable.

Improvements in the Stream-Line Filter

Development of a Type to Filter Bulky Precipitates

SINCE last year when the Stream-Line Filter, invented by Dr. H. S. Hele-Shaw, F.R.S., was first exhibited to the public at the Shipping Exhibition at Olympia (see THE CHEMICAL AGE, September 29, 1923, p. 342), considerable developments have been made with a view to increasing the practical scope of this instrument. It will be remembered that in its original form the device consisted of a pack of papers punched with large and small holes, arranged so that these holes formed tubes through the pack. The liquid to be filtered was pressure-fed to the series of large holes, and passed between the sheets out into the small holes, any solid or even colloidal particles being quite unable to enter the interstices between the sheets. Very valuable results have been obtained with this form, and a number of industrial filters have been installed for various purposes. One particularly interesting use which has been proved in the research laboratories of the Stream-Line Filter Co., as a result of questions asked at a meeting of the Oil and Colour Chemists' Association, is its value in filtering linseed oil. Many filters will give a clear, bright filtrate with this oil, but that from the Stream-Line Filter is distinct in that all tendency to form "foots" on standing is removed, so that the substance which causes foots-formation is actually filtered out.

A Form for Bulky Solid Deposits

As noted in the article previously referred to, the form of filter there described was obviously not suitable for dealing with liquids containing large quantities of solids. Recent developments have been directed to obtaining a form of filter on the stream-line principle capable of working with such material. Reference to Fig. 1 shows the form of the original

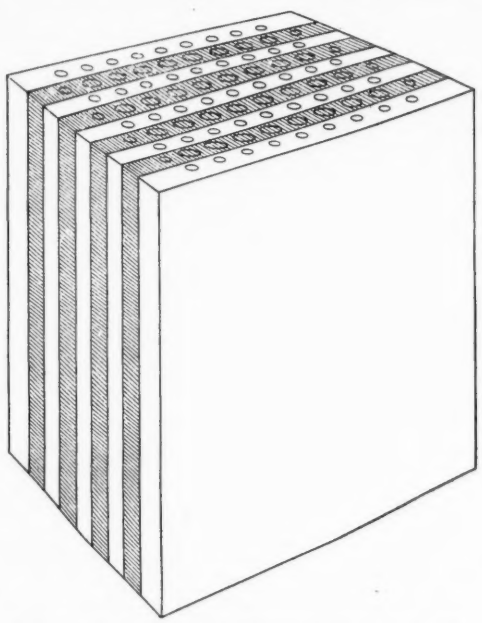


FIG. 1.—ILLUSTRATING CUTTING OF THE PACK.

pack, the large holes being the points where the liquid is led in. By removing the shaded portions, the large holes are virtually run into one, and the space for solids to collect is greatly increased, the pack becoming a series of thin vertical blocks. These blocks are then separated and enclosed in simple frames, having at one end an arrangement of a groove to connect the outlet holes together, and at the other a screw necessary to obtain the required pressure on the pack. A series of frames may then be placed together in the ordinary form of filter-press, and they are in this way particularly suitable for vacuum filtration. An experimental filter on the continuous vacuum principle has also been devised, and is illustrated in Fig. 2. It will be seen that a good thick cake, which is readily removed, is formed on the frames. The edges of the paper slips are planed off smooth in order that this removal may be facilitated.

Improvements in Detail

The Stream-Line Filter is adapted to a very wide range of liquids, and as its efficiency in different cases depends on having the right pressure on the packs, paper is now standardised in nine grades for industrial purposes. Sheets are supplied in packs of definite numbers, ready for insertion in the filter, it

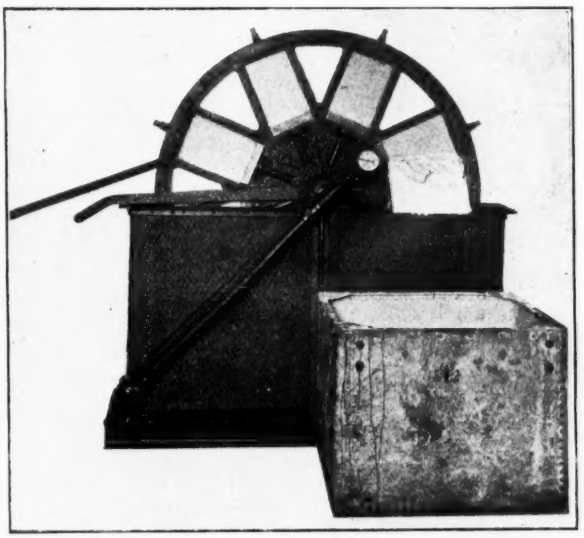


FIG. 2.—EXPERIMENTAL ROTARY VACUUM FILTER ON THE STREAM-LINE SYSTEM.

being necessary then merely to screw down the pack to obtain the specified number of sheets in a given height.

Developments of the filter in its various industrial forms are still in progress, but a number of firms have installed experimental models in connection with various processes.

There is a laboratory edition of the filter, with papers consisting of a single ring, and an improved form of this will very shortly be available. It will be possible to use a short or long pack in the new model, and a most valuable feature from the experimental point of view will be the simple device of obtaining the pressure by screwing down the pack against a heavy spring, calibrated so that the actual pressure obtained can be read off on the screw-head at the top.

Ex-Government Chemical Plant

FOR some months now the disposal of the surplus chemical plant ordered by the Government has been in the hands of the George Cohen and Armstrong Disposal Corporation, who have still a very large range at various factories in the country taken over from the Disposal Board. The apparatus is mainly intended for explosives manufacture, though a proportion of it has been constructed for other purposes, and much of it is adaptable to general use. Some of the plant available includes cast iron enamelled steam-jacketed nitrating machines, cast iron steam-jacketed sulphonating pots, jacketed and unjacketed nitrating pots, mild steel stills, acetone rectifying stills, an oil-gas-making plant by Mansfield and Co., of Nottingham, 90-gallon stoneware jars, hydro-extractors, and storage tanks in mild steel, incorporating machines, and many other items. Much of the plant is practically new, and it is to be disposed of separately or in small lots to suit the requirements of individual purchasers, since the complete works, such as that at Queensferry, have not found buyers. This arrangement is, of course, much more likely to be of value to the chemical industry, since under peace conditions there is little value in large nitrating plants laid out for explosives manufacture.

Steam Generation at 3,200 Lb. Pressure

The Properties of Water Under Critical Conditions

As is well known, steam is now being generated under the critical conditions of approximately 3,200 lb. per square inch pressure and 706° F. (dry saturated steam) by means of the "Benson" super-pressure steam generator, accounts of which have already appeared in the engineering and general technical Press.

This remarkable process raises some very interesting points with regard to the properties of water at the critical conditions. In the first place the rate of expansion becomes abnormally high above about 1,500 lb. pressure per square inch as the critical conditions are approached, which, of course, is more or less a usual property of all liquids. For example, at freezing point (32° F.) the density of water in lb. per cubic foot is 62·4, whilst at 212° F.—corresponding to atmospheric pressure—the figure is 59·9 lb. per cubic foot. At a boiling point of 400° F., equivalent to 247 lb. per square inch absolute, the density is 53·5 lb., whilst at 600° F. and an equivalent pressure of 1,540 lb. per square inch the figure is 41·8 lb. From this point a study of detailed steam tables, such as Goodenough's, shows that whilst the boiling point of water only rises from 600° to 706° F., the pressure increases over a much wider range, from 1,540 lb. absolute to 3,200 lb., and in the same period the density of water falls in a very marked and abnormal manner. For example, at 690° F. boiling point, equivalent to 2,883 lb. absolute, the density of water is only 31·1 lb. per cubic foot, approximately half that at freezing point, whilst, finally, under the critical conditions of 706° F. and 3,200 lb. the figure is 20·1 lb.

In the "Benson" coil generator, therefore, the temperature of the water is increased under fixed pressure conditions of 3,200 lb. by means of a force pump, until at 708° F. the volume is three times that at freezing point, being then bodily converted into steam at the same volume without any absorption of latent heat.

The same abnormal conditions when beginning to approach the critical point are shown in the figures for the latent heat of steam. As is well known, the figure for 1 lb. of water at 212° F. under atmospheric pressure is 970·7 B.Th.U., that is to say, this amount of energy in the form of heat is required to force apart the molecules of the liquid (water) at 212° F. and convert them into gas (steam) also at 212° F. Naturally of course as the pressure rises—and therefore the volume of the water—the amount of latent heat is less, since the expansion when conversion into steam takes place is not so great, but this diminution—as already stated—becomes quite abnormal under high pressure conditions. Thus, for example, taking typical figures at random, at 620 lb. absolute pressure the latent heat of steam has fallen to 727 B.Th.U., whilst at 1,043 lb. it is 644·8, and at 1,784 lb. the figure is 518 B.Th.U. Over 2,000 lb. the abnormal rate of the drop commences, being at 2,205 lb. 443 B.Th.U., at 2,699 lb. 335 B.Th.U. and at 2,282 lb. only 280 B.Th.U. Then at 3,075 lb. the figure has fallen to 198 B.Th.U., whilst between this point and 3,200 lb. it falls to zero.

It will be remembered that the essential feature of the remarkable "Benson" steam generator is that by converting in this way water into steam without the absorption of latent heat, and therefore without ebullition, the whole of the problems of the coil super-pressure steam generator have been entirely eliminated, since it is not possible by any other method to generate steam under conditions of ebullition and the formation of comparatively large bubbles of steam in a narrow bore coil of 1 in. diameter or less.

Finally, from the scientific point of view, this work of Benson's will probably result in some considerable alterations to the figures given in steam tables at very high pressures. For example, it is stated that the critical conditions are approximately 3,200 lb. gauge pressure and 706° F., but these figures have apparently never been determined with any great accuracy, and in the same way some alterations will probably be necessary in the Mollier diagrams. D. B.

Experiments on Tanning Waste

A CONSIDERABLE sum has been subscribed by three-fourths of the leather tanning industry in the State of Pennsylvania for conducting experiments on the treatment of tanning waste avoid pollution of the rivers.

Declining American Chemical Exports

THE exports of chemicals and allied products from the United States for the first six months of 1924 showed a decline of 10 per cent. as compared with the corresponding half of 1923. The decline was mainly in sulphur, industrial chemicals, coal tar products, gums and resins, pigments, paints, and varnishes, fertilisers, and explosives. The following table gives the principal figures in lbs. —

	Jan.–June, 1923	Jan.–June, 1924
Acids and anhydrides	10,847,002	11,769,356
Acetic acids	540,193	263,017
Sulphuric acid	3,568,630	5,887,873
Alcohols :		
Aluminium sulphate	17,308,240	15,564,783
Calcium compounds :		
Acetate of lime	15,049,047	10,921,320
Calcium carbide	3,292,775	6,175,839
Bleaching powder	16,785,683	11,533,276
Copper sulphate	1,417,374	1,634,296
Dextrine	8,803,293	12,729 908
Formaldehyde	694,070	1,550,142
Glycerin	692,111	876,047
Potash :		
Chlorate of	131,585	424,824
Bichromate of	2,231,428	544,242
All other	2,817,434	1,546,537
Sodas and compounds	206,941,400	157,442,295
Borax	21,770,090	17,694,517
Soda ash	14,351,970	11,732,694
Silicate	15,266,533	14,388,750
Caustic soda	58,703,050	44,262,355
Sodium bicarbonate	8,803,387	7,789,756

Alsace Potash Mines

IT is now reported that of the potash mines of Alsace, one-half are to be operated by their private owners and the remainder, on the basis of 200,000,000 francs to be paid in 20 years, have become the property of the French government. Judgment was given to this effect by the Mulhouse tribunal on April 24 and later ratified by agreement with the ministry at Paris.

The Alsace potash basin is now practically divided into two equal parts, one in private hands and the other the property of the state. The two groups are working together through a common selling organisation known as the Société Commerciale des Potasses d'Alsace, which will divide orders according to a common agreement. Production has increased rapidly over what it was when the mines were in German hands. The greatest production of the five years before the end of the war was that of 1913—350,000 metric tons. The year after the war, 1919, there were extracted 592,000 tons; in 1920—1,221,513 tons; in 1921—903,134 tons; in 1922—1,326,726 tons, and in 1923—1,577,736 tons. During the course of the first six months of 1924 there were produced 840,810 tons.

A German Chemical Writer

PROFESSOR ALBERT HESSE, who died a short while ago in Berlin, had been editor of the *Chemisches Zentralblatt* for 21 years. Previously he had done much work on the ethereal oils and sesquiterpenes both in their academic and industrial aspects, and was associated for some time with Heine and Co., of Leipzig. He was joint author with Professor Grossmann of a book entitled *England's Trade War and the German Chemical Industry*, and he also published a work, in 1909, on *The Development of the Ethereal Oil Industry in the Last 25 Years in Germany*.

The Sodium Nitrate Tariff Case

No form of sodium nitrate has ever been dutiable under a United States tariff, and an interesting point is now raised as to whether, under the terms of the tariff, "crude" sodium nitrate only is entitled to free entry and other forms are dutiable. It is argued that in the clause which gives free entry to "Sodium: Nitrate, sulphate, crude, or salt cake and nitre cake," the word "crude" covers both nitrate and sulphate, and that nitrate which is not crude must, therefore, be dutiable. The Manufacturing Chemists' Association and various importing interests are opposed to this restricted view, while domestic refiners of imported crude nitrate support it.

French Chemical Industry Notes

[From Our Own Correspondent.]

The French Parliament, having voted an initial credit of 30 million francs for the creation of synthetic ammonia works, preparations are being made at Toulouse for the realisation of the project. The new factory will be completed in two and a half years' time. Though the Board of the National Azote Office, specially charged with the control and supervision of the manufacture, is not yet constituted, the Consultative Committee nominated last May to study specifications and tenders has made appreciable progress, and under the presidency of M. Patart, general manager of the powder manufactory, it has put the finishing touches to the building plans and made a contract with Le Creusot for machinery and fittings.

Synthetic Oxalic Acid

Professor Matignon, of the College of France, and Professor Vor Holt, of Copenhagen, have synthesised oxalic acid by heating oxide of carbon under pressure in presence of potassium carbonate, obtaining oxalate of potash. The authors of this process have had remarkable success by operating at a temperature of 470° C., under 264 atmospheres pressure. Much interest has been aroused in French industrial circles by these experiments, as the new method—if developed industrially—could be lucratively exploited as a branch of ammonia synthesis, since the latter needs a considerable supply of hydrogen, to procure which recourse is had to coke ovens or water gas. The isolated carbonic oxide, which is a constituent of these gases, could be economically utilised, it is considered, in oxalic acid synthesis.

Other Recent Researches

The French Academy of Science, before which the above method was recently explained by M. Moureu, also heard an interesting account from the same source of the catalytic activation of ethylene by organo-metallic compounds, notably organo-metallic nickel. A note from Messrs. Jernbach and Stoleru, read by Dr. Roux, of the Pasteur Institute, demonstrated that the antiseptic power of the hop only manifested itself in cultivation *milieux* having a sufficient concentration in hydrogen ions. This fact, said Dr. Roux, was of great practical interest for the brewer, as it proved that the acidity which contributed to the stability of this beverage was also efficacious in the preservative properties of the hop.

Congress at Liège

The French chemical industry was well represented at the Congress of the Association for the Advancement of Science. M. Huybrechts, a professor at Liège University, presided over the chemical section which studied a number of comunications concerning industrial problems. Special interest was taken in a description by M. Lance of a process which promises to relieve French metallurgy from its dependence on foreign coke. This project substitutes oxide of carbon—produced in an annexed plant—for metallurgical coke in the blast furnace. A secondary source of profit arising from the innovation would be provided by liquid carbides and hydrogen. M. Grignard, of Lyons University, and M. Stratford contributed an informative study of the cracking of petroleum oils. M. Jean Pougnet read a paper on certain effects of ultra volet-rays and on the allotropic modification of bodies in a state of false equilibrium.

In discussing the communication of M. J. Pougnet, M. Meunier stated that gaseous mixtures such as oxygen and hydrogen, methane and air, coal gas or ether vapour and air, etc., reacted when in contact with a flaming body only in so far as the proportion of the constituents of the mixtures were comprised within certain limits. Such a fact appeals to the attention of those interested in mining exploitations and in all industries utilising gaseous compounds apt to give rise, with air, to detonating mixtures.

Colloids and the Colloidal State

M. August Lumière furnished an ingenious physical theory on this subject. The colloidal state of a substance is analogous to that of the product obtained by the ancient alchemists when by the distillation of mechanical mixtures of water and finely ground and powdered gold they realised a more or less stable fluid having a special characteristic consistence at the mercy of certain "shocks." Colloidal substances are made up of spherical particles so small as to defy the microscope, but not the ultra-microscope, which "perceives" them through the indirect phenomena of luminous diffraction. For M. Lumière these "sphéricules" seem positively electrified and repel each other in the liquid medium where they are suspended.

The blood, according to M. Lumière, is a veritable colloidal solution containing billions of tiny electrical globes, the collective superficial area of which represents several acres. The enormous electrical capacity and the potential that all this involves constitute the maintaining force of life. Neutralisation of the electricity of the colloidal spheres—analogous to the "earthing" of a condenser—would cause the agglomeration—the flaking or sticking together—of the "sphérules," whence coagulation, asphyxia and death. This would explain the notorious "anaphylactic shock" of Professors Richet and Widal (produced by an injection of serums in systems already fed or saturated with chemically identical substances)—a phenomenon long in puzzling contradiction with Mithridatism or immunity to poisons. M. Lumière's views have aroused the liveliest interest here. The mechanism of colloids enters upon a period of investigation the results of which promise to bring about a revolution in chemistry, medicine and biology.

It is curious to note in passing the similarity of the theory as to the electrical importance of the blood, with that of M. G. Lakhovsky, which at present forms the basis of a new method of cancer research in the Paris Salpetrière Hospital. Cancers provoked in plants by inoculation—after resistance to all other forms of treatment—have been completely cured by the rays of an oscillator emitting 2 metre waves with a periodicity of 150,000,000 per second. This so-called "Lakhovsky Radio-Cellulo-Oscillator" is the application of a theory that also conceives life as due to the unbroken equilibrium of electrical ondulations.

A New Wood Paper

The French Laboratory of Colonial Products has studied the so-called Bahia wood which exists in abundance in French West Africa, with a view to ascertaining its possibilities from the point of view of paper production. The report of the results of these researches indicates that this species, which the Colonists call "African lime or linden," has a density of about 550 to 560 and is relatively soft. It is utilisable in carpentry and in furniture making. The cellulosic leaves obtained were white with a light greenish yellow shade; they were supple and soft to the touch and offered adequate resistance to the usual test strains. It is therefore declared that Bahia is of "acceptable quality" and capable of comparison with ordinary wood papers. The pulp yield of Bahia is about 33 per cent. Its transformation entails only an average treatment.

New Oil and Liquid Combustibles School

It has been decided to open in Strasburg a National Superior School of Petrolum Oil and Liquid Combustibles. The school will comprise three essential sections devoted to chemistry, exploitation and geology. It will replace the present Institute of Petroleum and the administration of the school will be confided to a representative Board of eminent technicians and scientists.

Two New Companies

A new and important company, formed to study and exploitation of all inventions and patents relative to fertilisers and chemicals and more especially to hydrogen, azote and their derivatives, is announced. It has a capital of 8,000,000 fr. in 500 fr. shares, fully subscribed in cash, and its registered offices are at 48, Rue St. Lazare, Paris. The first directors include MM. Georges Claude, Rueil (Seine and Oise), Yves Le Troquer, ex-Minister, Louis-Albert Lheure, General Inspector of the State Powder Manufactory, and Aimé-Antoine-Marie Lepercq, engineer of Prague (Tchecoslovakia).

Under the title of "The Plastose" a company has been constituted to manufacture and sell "objects in plastic matters, or other chemical products." Its capital is 3,050,000 fr. in 5,000 fr. shares, 360 of which have been allotted as remuneration for technical and other acquisitions. Mr. Edgar Amphlett, engineer, of Beecholme, Tolworth Road, Ipswich, England, is one of the first directors. The registered office in St. Florent, near Niort, the Paris office at 45, Boulevard St. Martin.

The "Born Chemist"

To the Editor of THE CHEMICAL AGE.

SIR,—In the editorial columns of THE CHEMICAL AGE for August 9 there appears an article entitled "What is a 'born chemist'?" As no born chemists appear to have accepted the offer you so courteously made in the last paragraph of that article to continue the discussion so ably introduced, may I presume on your generosity by asking for an extension of the privilege to one who is painfully aware that he does not belong to the select circle of born chemists? Whether your correspondent is satisfied with your reply to his query I do not know. Might I suggest that a man with such a *flair* could profitably apply himself to the solution of other conundrums—say, the vexed question of the habitat of *Musca domestica* during the winter season?

Your answer to the question appears to be that there is no such person as a "born chemist." It is more from your argument than from your conclusion that I beg to dissent, for I think that exception may fairly be taken to two of the main views you have expressed. Your criterion or mark of a great chemist—namely, his ability to forecast the course of a chemical reaction and to deduce the properties of a compound from its formula—is to me somewhat novel. Chemistry is essentially a practical experimental science, and demands a high degree of manipulative skill. No chemist is worthy of the name who cannot carry out all his own experiments with the utmost reliability and accuracy. Surely all our great chemists are not engaged on the problems of forecasting reactions and deducing properties from formulæ—some of our physical and bio-chemists, for example,. There are other ways in which chemists have won a way to fame. In fact, a high degree of success in these two fascinating exercises can be obtained by men of a certain mental dexterity while reclining at ease in an armchair and without any great familiarity with the inside of a laboratory. In fact, your "hall mark" seems to have its chief application to those engaged in theoretical organic chemistry.

Now, your main line of argument appears to rest on the fact that ability to perform these two tasks must be intuitive and can be acquired, given a certain type of mind and brain capacity. I do not think this will be so readily conceded. Intuition is the power to form an immediate judgment without any conscious process of reasoning. The test is "immediacy." A close observer of his fellow men will have noted the difference between the intuitive faculties of one man and another. Experienced teachers know full well that all their students are not endowed to the same extent in this respect. Intuition is closely allied to instinct, and is not entirely a matter of experience or training, though you observe that intuitive powers may be developed by assiduous training, and with this I agree. Probably all men have intuitive power in some degree, but we are not all born equal in this respect any more than we are in our abilities as mathematicians, poets, painters, or musicians. The power is inherent, and with the more fortunate among us is a talent or gift to be envied.

It is not quite clear to me what you understand by a "certain type of brain" or "mind." You say that a "born" chemist might equally well have become a born physicist or a born scientist in any other branch demanding a similar type of brain or memory. I do not think this will meet with so general an agreement. Is it so certain that, for example, the Astronomer-Royal would have been equally distinguished in biochemistry, or that mere chance prevented Emil Fischer from standing in Sir J. J. Thomson's shoes? It depends on the elasticity of your definition of a "certain type of mind," but to me it seems a generalisation which lacks substantiation.—Yours, etc.,

P. H. LOGISTON.

[Thank you; quite the sort of letter we welcome. If the "born chemist" theory is unsubstantial, we see no reason why its holders should not be finished off as Lavoisier and others finished off our correspondent's Phlogistian ancestors of the eighteenth century.—ED. *C. A.*]

Wood Tar Wanted

A CORRESPONDENT in Danzig wishes to be put in touch with firms able to supply wood tar at £5 per ton. The name and address of the inquirer can be obtained from THE CHEMICAL AGE.

New Income Tax Provisions

To the Editor of THE CHEMICAL AGE.

SIR,—The Finance Act, 1924, which was passed on the 1st instant, may not contain much of absorbing interest but, generally speaking, its provisions are beneficial to the taxpayer. The provisions of general interest are:—

(1) The rate of tax remains at 4s. 6d. (reduced rate 2s. 3d.) for 1924–25. (2) Inhabited House Duty is wholly repealed. (3) The allowance of £45 in respect of housekeeper and widowed mother is increased to £60. (4) The housekeeper allowance may now be claimed whether any child is being taken care of by such housekeeper or not. (5) Income from foreign possessions may now be adjusted to the actual amount of the first three years. (6) An appeal may now be made to the Special Commissioners by persons claiming to be resident or domiciled abroad on the questions of domicile, ordinary residence and residence. (7) A collector may now take proceedings to recover summarily amounts of tax under £50. (8) Dividend warrants must, after November 30 next, show the gross and net amounts and the rate and amount of tax deducted.—Yours, etc.

W. R. FAIRBROTHER.

67–68, Cheapside, London, E.C.2.

Pulverised Fuel Progress

THE Vickers and International Combustion and Engineering, Ltd., of Africa House, Kingsway, London, W.C.2, have received another order for a complete pulverised fuel installation for the power station of the County Borough of Derby.

The plant will consist of two Babcock and Wilcox water-tube boilers to give steam at 300 lb. per sq. in. super-heated to 750° Fahr.; each boiler having a patent Lopulco combustion chamber with patent water screen and passages inside the walls for pre-heating air; one dryer of improved patent Lopulco type which will reduce the moisture in the fuels to about 5 per cent.; two Raymond roller pulverisers, each having six rollers to grind the fuel to such fineness that 90 per cent. will pass through a 100-mesh sieve, each machine being complete with fan and cyclone; screw conveyor to deliver pulverised fuel from cyclones to the boiler bunkers; two groups of Lopulco feeders each with five screws for delivering the pulverised fuel to the burners and operated by variable speed electric motors; ten Lopulco burners of the flat flame type with primary air ports designed to rest on the suspended arches of the combustion chambers. It is the fifth large order for Lopulco plant which has been placed within a few months in this country, and shows the tendency of British power station engineers towards the use of pulverised fuel.

The International Combustion Engineering Corporation of New York, which is an associated company of the Vickers and International Combustion Engineering, Ltd., London, received the following orders for Lopulco equipments during the month of June:—

Narragansett Electric Lighting Co., with six boilers; St. Joseph Lead Co., Rivermines, with two 1,000 h.p. Heine boilers; Alleghany Steel Co., Pittsburg, with two 760 h.p. Stirling boilers. The Narragansett Electric Lighting Co. has been burning fuel oil exclusively, but it has been decided that pulverised coal will prove fully as flexible as oil; each boiler will consume about 2¼ tons of coal per hour.

New Oil-Refining Process

REPORTS state that the world rights of the new "Mutolin" oil-refining process have been secured by an English group, and that a holding company is now being formed to deal with the rights for the various countries. It is stated that the economic and technical advantages of the process have been examined and reported upon by well-known petroleum experts. A contract for the Italian rights has been concluded, the British Empire rights being vested in the Anglo-Scottish Finance Corporation. A demonstration of the working of the process will probably be held early in September, at which leading international petroleum technologists will be invited to be present.

From Week to Week

THREE WORKPEOPLE engaged in the chemical industry were killed in the course of their employment during the month of July.

THE RECENT QUARTERLY REPORT of the General Federation of Trade Unions records the recent affiliation of the Bleachers and Dyers Societies.

MR. WALTER HOLE has been appointed general manager of G. A. Shankland, Ltd., glue, grease, and fertiliser manufacturers, Isis Mills, Eynsham, Oxford.

A NEW METHOD of reducing refractory ores of rarer metals, particularly titanium, has been developed in the States by the Metal and Thermit Corporation.

MR. J. FERGUSON BELL, engineer and general manager of the Derby Gas Co., has been elected president of the Institution of Gas Engineers for the year 1924-25.

THE DEATH IS ANNOUNCED of Mr. William A. Smith, chairman of Bryant and May, Ltd. Mr. Smith, who was 76, had been connected with the firm for 27 years.

OFFICIAL FIGURES show that Japan's exports of menthol to England during 1923 amounted to 19,973 lb. The total exports of menthol during that period were 227,119 lb.

THE MADRAS GOVERNMENT is understood to be contemplating the establishment of a Science Research Institute in Madras, on the model of the Indian Institute of Science at Bangalore.

ALDERMAN C. H. WATERHOUSE, J.P., who has died aged 68, was a member of the firm of J. Waterhouse and Co., Ltd., druggists and drysalters, Ashton-under-Lyne, and was twice Mayor of the Borough.

A SERIOUS FIRE occurred on August 22 at the premises of Winstanley and Fairhurst, chemists, Wigan. A drum of turpentine in the basement caught fire, igniting a gas meter and stores of chemicals.

RECENT CONTRIBUTIONS to the Imperial College of Tropical Agriculture include gifts of £105 from the British Sulphate of Ammonia Federation, from Viscount Leverhulme, and from the New Trinidad Lake Asphalt Co.

ON MONDAY, SEPTEMBER 1, the Institution of the Rubber Industry will meet at 8 p.m. at the Engineers' Club, Coventry Street, London, W., and a paper will be read by Dr. G. Stafford Whitby, on "The Acidity of Raw Rubber."

THE MEMORIAL TO JOSEPH ASPDIN, the inventor of Portland cement, which the American Portland Cement Association are presenting to Leeds, has now been erected in the Town Hall, and will be unveiled on Saturday, September 6, at 12.30 p.m.

PROFESSOR HUGH S. TAYLOR, of Princeton University, U.S.A., has left for a six months' visit to Europe, during which he is to investigate laboratory and industrial conditions in Great Britain, France, Germany, and Scandinavia.

RECENT TENDERS ACCEPTED include one of £3,686 8s. by W. W. Webster, Guilsborough, for sewage works at Byfield, and one of £370 by Manlove, Alliott and Co. for the erection of a high pressure steam disinfector for Bognor District Council.

TWO NEW ACID COLOURS said to possess exceptional fastness to light have just been placed on the market by the Dyestuffs Department of E. I. du Pont de Nemours and Co. The new colours are known as Pontacyl Light Red BL and du Pont Alizarine Saphirole SE.

AN AGREEMENT has been signed between France and Germany relating to the distribution of potash in the American market, which last year absorbed 200,000 tons. France will participate to the extent of 37·5 per cent. and Germany to 62·5 per cent., and the agreement is to operate for three years.

REPORTS STATE THAT the nitrogen fixation plant (direct ammonia-synthesis system) of the Mathieson Alkali Works, U.S.A., is working on a large scale, and a yearly production of over five million pounds of NH_3 will eventually be reached. The hydrogen will be obtained from the electrolytic alkali plant.

RECENTLY APPOINTED DEPUTY LIEUTENANTS of the County Palatinate of Chester include Mr. Roscoe Brunner, second son of the late Sir John T. Brunner, and chairman of Brunner, Mond and Co., Ltd., and Captain the Hon. W. Hulme Lever, son of Lord Leverhulme, and acting chairman of Lever Bros., Ltd.

ACCORDING TO OFFICIAL STATISTICS the following are the numbers at present employed in the following industries in Spain :—Alcohol (factories), 706 ; chemical products (factories), 225 ; dyeworks, 660 ; fertilisers, chemical (factories), 138 ; soap manufacturers, 920 ; sulphur (merchants and exporters), 182.

A COMPANY HAS BEEN FORMED to work a new system of multiple unit retorts for extracting gas, gasoline, tar dyes, sulphate of ammonia, ammonia, and potash from lignite near Kelso, Washington. The process will also be used to extract turpentine, creosote and wood alcohol from timber waste.

THE CHEMICAL EQUIPMENT ASSOCIATION of America announces the change of name of the organization to Association of Chemical Equipment Manufacturers. The Association recently incorporated under the Membership Corporations law of New York State as a non-profit-operating membership corporation.

AN INCREASE OF OVER 30,000 persons unemployed is recorded for the week ending August 18. The number of persons then on the registers of employment exchanges in Great Britain was 1,122,200, being 30,357 more than on August 11, but 163,423 less than the figures recorded on December 31 last year.

DR. RALPH H. MCKEE, a British scientist holding the position of professor of chemical engineering at Columbia University, has received the honorary degree of Doctor of Laws from Carthage College, Carthage, Ill., U.S.A., after delivering the opening address on "The Sciences as the Modern Humanities" at that institution.

AT AN INQUIRY into a case of lysol poisoning at Northampton, on Wednesday, the Coroner inquired of the medical witness why lysol was not a scheduled poison. The doctor said he did not know, but thought it should be. It had been so scheduled in Germany. The Coroner said he would communicate with the Home Office on the matter.

THE FRANKLIN INSTITUTE of America celebrates its centenary on September 17 to 19. Among a long programme of addresses the following speakers are noted :—Sir Ernest Rutherford on "The Natural and Artificial Disintegration of Elements," and Professor F. Haber, of Berlin, on "Technical Results of the Theoretical Development of Chemistry."

DR. F. E. BREITHUT, who has been in Europe for some time on behalf of the U.S.A. Department of Commerce, engaged in a special study of the conditions of the dyestuff industry, has now completed his mission and has returned to Washington to present his final report. With the opening of the autumn term Dr. Breithut will resume his duties in the chemical department of New York City University.

THE OPERATION of the Australian dumping duties is being severely criticised in Sydney, as it is stated that these duties are applied at short notice to products from any country (including chemicals from Great Britain), and it is contended that they were only supposed to operate against countries with a depreciated currency. The present plan is said to lead to great uncertainty in trading conditions, as detail alterations in the tariff are announced almost weekly.

THE REPORT OF THE GOVERNMENT OILFIELDS DEPARTMENT for the year 1923, says the production of petroleum from the Argentine during the year totalled 415,558 cubic metres. Including the production of private companies, the total output of oil during the year amounted to 540,485 cubic metres, which, at the density of 0.92, is equivalent to 497,246 tons of oil. The nett profit realised by the Government during the past financial year in its petroleum ventures amounted to $6,000,000 (paper).

THE FUNERAL of Mr. W. A. Davies, managing director of Davies, Sons and Co., manufacturing chemists, Derby, took place at Derby on Monday. Mr. Davies, who was sixty years of age, had been depressed for some time by fears respecting his health and on the previous Friday morning he was found dead on the floor in the ether room, having taken a large quantity of prussic acid. It was stated that there was no cause, financial or other, for Mr. Davies's worried state of mind and the Coroner, who had known him well, testified to his high character. The verdict was "Suicide while of unsound mind."

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Patent Literature

Abstracts of Complete Specifications

219,348. Stable Aqueous Emulsions of Pitch and other Unsaponifiable Matter, Method of Obtaining. F. C. Thornley and F. F. Tapping, Hyde Park Hotel, Knightsbridge, London, S.W.1, and O. Reynard, 8, Inkerman Terrace, London, W.8. Application date, January 26, 1923.

A solution of any water soluble alginate, *e.g.*, ammonium alginate or sodium alginate, and excess of ammonia or other alkali is heated to boiling point, and the unsaponifiable matter added. The latter may be in liquid form or finely divided solid form, and the concentration of this solution should be 1–10 per cent. The mixture is agitated while heating, and a stable emulsion which is a colloidal solution is obtained. It is possible to emulsify a small proportion of pitch, tar, or wax in the alginate, or *vice versa*. In the former case, *e.g.*, an emulsion of sodium alginate 85 per cent., coal tar pitch or petroleum pitch 10 per cent., and tar 5 per cent. may be used as a binding agent for briquetting powdered coal or other material. The alginate may contain cellulose, and may be prepared from sea-weed by macerating with a water-soluble alkaline solid material.

219,349. Dyeing of Cellulose Acetate or Products made therewith. British Celanese, Ltd., 8, Waterloo Place, London, S.W.1, and C. H. Ellis, of British Celanese Ltd., Spondon, near Derby. Application dates, January 27, March 17, and May 22, 1923.

Cellulose acetate and products made from it may be dyed with organic compounds or colouring matters which are practically insoluble in water, by converting them into more soluble modifications by treatment with sulphoricinoleic acid or other sulphated higher fatty acid, sulphonated or other derivatives of these containing salt-forming groups, or salts of such acids or bodies, *e.g.*, their alkali or ammonium salts. The process may be employed for dyeing with non-sulphonated or other insoluble organic compounds of the azo class, or for dyeing by the azoic or development process with simple amino bases, or any other colouring matters having an affinity for cellulose acetate, but which are insoluble in water, such as the unreduced colouring matters of the aryl or substituted aryl benzo or naphtho quinone mono-imide series; also colouring matters of the diphenyl methane, triphenyl methane, triaryl methane, oxazine, thiazine, unreduced indigoid, or basic derivatives of the anthraquinone series. A large number of examples of the use of such dyestuffs are given.

219,351. Refining Commercial Benzol, Process of. E. G. Somerville, Wellington House, Buckingham Gate, London, and E. C. Williams, 130, Fitzwilliam Street, Huddersfield. Application date, February 23, 1923.

Commercial benzol is refined by treating with an oxidising gas, preferably air or oxygen, at a pressure of several atmospheres, preferably in the presence of an alkali such as caustic soda. In an example, the benzol treated had a specific gravity of 0·8798, and contained benzene 67 per cent., toluene 21 per cent., xylene 1·8 per cent., paraffin 1·8 per cent., carbon bisulphide 0·07 per cent., and unsaturated hydrocarbons 8 per cent. The benzol was treated for four hours with half its volume of normal caustic soda solution, and oxygen at 200 lbs. pressure and a temperature of 80° C. This reduced the bromine value from 4·40 to 4·18, and the percentage of sulphur from 0·796 to 0·657. Further treatment at 185° C. reduced the bromine value and sulphur content to about the same values as those obtained with sulphuric acid treatment. The resulting benzol remains colourless after exposure to light. The product may be distilled to obtain a distillate lighter in colour than the original benzol.

219,359. Purification of Gases, Process for. M. Krafft, of Verein für Chemische und Metallurische Produktion, Parkstrasse Hruschau Czecho-Slovakia. Application date, March 19, 1923.

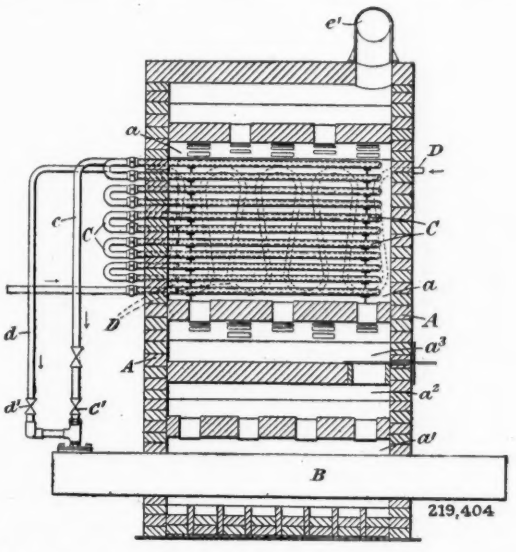
The purification of gases from very finely divided inorganic solid substances is necessary when the gases are to be employed in catalytic reactions, but such purification usually involves large or expensive filtering or washing apparatus. In the present invention, it is found that the purification may readily be effected by means of charcoal of high adsorbing or decolorising power. It is sometimes possible to form a condensation product containing the impurities during the process of purification. In the manufacture of sulphuric acid from burner gases, the sulphur trioxide in the gases may be adsorbed in the charcoal, and the steam may also be condensed by maintaining the filter chamber at a low temperature, so that liquid sulphuric acid is formed. The condensation may diminish the purifying power of the charcoal. The filtering surface required is only a fraction of that necessary when employing other filtering materials.

219,403. Cracking of Oil. V.L. Oil Processes, Ltd., and O. D. Lucas, Vickers House, Broadway, Westminster, London. Application date, April 26, 1923.

This process is of the kind in which all the vapour is removed from a still by steam or an inert gas, and brought into contact with a heated catalyst. In this invention a small proportion of ammonia, with or without hydrogen, is added to the oil vapour in the cracking retort to increase the saturation of the cracked hydrocarbons, and prevent the formation of free carbon. The proportion of ammonia employed is about 0·1 per cent. by weight. The carrier for the oil vapour may be steam, or a part of the permanent gas produced by the cracking operation. In the latter case, the oil may be vaporised and passed into the cracking retort at the beginning of the process, and the uncondensible gas obtained after condensing the lighter oils may be passed back into the still to serve as a carrier for the oil vapour.

219,404. Cracking of Oils. V.L. Oil Processes, Ltd., O. D. Lucas and E. L. Lomax, Vickers House, Broadway, Westminster, London. Application date, April 26, 1923.

The oil is preheated to a temperature considerably above the boiling point of the highest boiling fraction at a pressure



which is sufficient to prevent vaporisation of the lighter fractions, and then suddenly expanded before passing into the retort. The preheating temperature is such that complete vaporisation takes place on expansion. At the moment of expansion the vapour may be mixed with some of the permanent gas obtained by cracking, together with a small proportion of ammonia, with or without hydrogen. The cracking retort B is surmounted by a bank of oil heating tubes C in the upper part of the furnace chamber *a*. A gas supply tube D also passes through the heating chamber. The hot gases from the chamber a^1 pass upwards through intermediate chambers a^2, a^3 which may be provided with auxiliary burners to supply any additional heat required for the tubes C. Any excess of gas may be by-passed to the

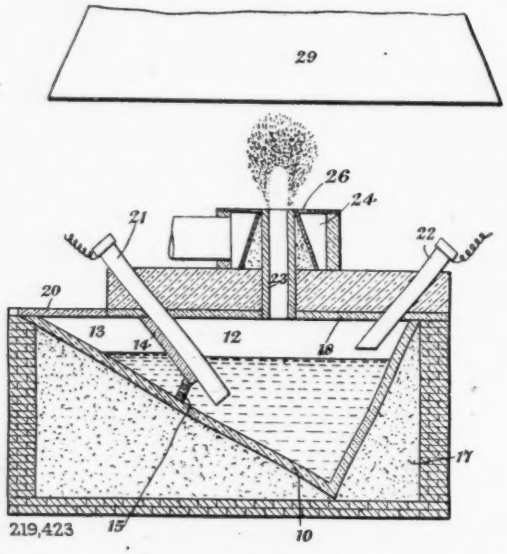
flue e^1. The oil tubes C are connected by a tube c, valve c_1, and a spraying nozzle to the retort B. The gas tube D is also connected by a tube d and valve d^1 to the spraying nozzle. The temperature of the heating tubes is kept below the cracking point, *e.g.*, when treating gas oil boiling at 200°–350° C. the temperature should not be above 400° C., and a pressure of 200 lbs. per square inch would be necessary to maintain the oil in a liquid phase. The cracking retort is heated to about 550° C. The process is suitable for oils which are not destructively distilled on heating to the temperature employed, but for oils which undergo destructive distillation from a temperature of 380° C., only those having a boiling point up to 350° C. are suitable. Any condensation of the vapour by expansion into the retort B may be prevented by heating the permanent gases and the hydrogen or ammonia which are added, to a higher temperature to supply sufficient heat to prevent condensation. The retort B may contain a catalyst.

219,420. Waste Lime from Chemical Works, Utilisation of. E. Smith, The Grange, Strines, Cheshire. Application dates, May 5, October 27, 1923.

The object is to utilise the waste lime produced in the Solvay process. The lime is mixed with a suitable proportion of an adhesive such as starch, dextrine, glue, gelatine, gum, or with clay, earth, or other colloidal material, such as silicious or aluminous clay, chalk, slate, etc. The proportions employed are approximately lime 264 parts and adhesive 7 parts, or lime 100 parts and colloidal clay 5–10 parts. The product is suitable for cleaning or polishing metal, or for other purposes.

219,423. Zinc Oxide, Manufacture of. W. J. Mellersh-Jackson, London. From the New Jersey Zinc Co., 160, Front Street, Manhattan, New York. Application date, May 3, 1923.

It has been discovered that zinc oxide of greatly improved properties and ultra-microscopic fineness can be obtained by



oxidising an issuing stream of metallic zinc vapour by a blast of relatively cool air which encloses the zinc vapour and instantaneously cools the particles of zinc oxide to a temperature below 350° C. The zinc oxide obtained is of much greater fineness than that obtained by the American or French processes.

The crucible 10 is V-shaped in cross section and is constructed of a mixture of fireclay 40 per cent. and carborundum or calcium silicide 60 per cent. The crucible is divided into two compartments, 12, 13, by a partition 14, and perforated diaphragm 15, and is enclosed by heat-insulating material 17, such as "Sil-o-cel." The crucible is closed by a cover 18, the part 20 of which is removable. A graphite electrode 21 dips into the molten zinc, and a similar electrode 22 terminates above the metal. A nozzle 23 extends upwards, and is surrounded by an annular chamber 24 which is supplied with compressed air to form the blast through a discharge orifice 26. The level of the molten metal is maintained by adding zinc to the compartment 13. The zinc vapour burns to form zinc oxide, which is drawn into a flue 29.

The air blast very greatly reduces the size of the zinc flame from several feet which a free-burning flame would occupy, to less than one foot. The chilling of the zinc oxide particles is practically instantaneous, so that the hand may be passed through the upper part of the flame without injury. In an example, the velocity of the flame was about 50 feet per second, the nozzle 23 was four inches in diameter, and about 150 lb. of zinc were distilled per hour. The temperature of the gases entering the flue 29 varied from 20° C. to 60° C., and about 900 cubic feet of air per minute were used. The particles of zinc oxide produced had an average particle size of 0·15 microns, compared with 0·38-0·52 microns for zinc oxide obtained by the American process. The zinc oxide obtained is particularly suitable as a filler for rubber, to which it imparts an increased resistance to abrasion and an increased tensile strength. The vulcanisation of the rubber is markedly accelerated without the addition of any accelerator.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention: 196,624 (Brünn-Königsfelder Maschinenfabrik der Maschinen- und-Waggonbau Fabriks Akt.-Ges.) relating to the fractional distillation of petroleum and similar hydrocarbons, see Vol. VIII p. 708; 208,516 (Syndicat L'Etudes Chimiques) relating to a process for the recovery of nitrogen and acetone from molasses and vinasses, see Vol. X., p. 202; 214,940 (G. Linnmann) relating to a process for obtaining valuable hydrocarbons from material of inferior value, see Vol. XI., p. 16.

International Specifications not yet Accepted

217,936. Dyes. Akt.-Ges. für Anilin-Fabrikation, Treptow, Berlin. International Convention date, June 23, 1923.

Azine dyes are obtained by treating the compounds obtained by alkali fusion of *p*-diazines having as members an 8-sulpho-1 : 2-naphthalene ring and another ring system, with a sulphur halide or a material yielding a sulphur halide. In an example, the compound obtained by caustic potash fusion of 1 : 2 : 1^1 : 2^1-dinaphthazine-8 : 8^1-disulphonic acid is heated with sulphur monochloride to 80° C. Blue shades are obtained on cotton from a sodium sulphide bath. The dyeing properties of the products depend on the temperature, solvent, and catalyst when treating with sulphur chloride. Thus, different shades are obtained with the dyestuff, and also after oxidation by heating to 115° C. and by adding aluminium chloride. Other examples are given in which the same material is heated with nitrobenzene, cuprous bromide, iodine, and sulphur monochloride at 140° C., and also by heating with nitrobenzene, cuprous iodide, and sulphur monochloride at 85°-90° C. Examples are also given, using other starting materials such as 8-sulpho-1 : 2-naphtho-phenazine, and 8-sulpho-1 : 2-naphtho-3^1-aminophenazine.

218,237. Catalysts for Ammonia Synthesis. Ammonia Casale Soc. Anon., Lugano-Massagno, Switzerland. (Assignees of L. Casale, 9, Via del Parlamento, Rome). International Convention date, June 29, 1923. Addition to 197,199.

Specification 197,199 (See The Chemical Age, Vol. VIII., p. 652) describes the production of a catalyst for ammonia synthesis by injecting oxygen under pressure into heated iron. In this invention, over 10 per cent. of an oxide irreducible by hydrogen is added during oxidation—*e.g.*, bauxite, magnesia, lime, and dolomite. A crucible lined with similar material is used.

218,242. Absorptive Carbon. E. Urbain, 30, Avenue de l'Observatoire, Paris. International Convention date, June 25, 1923.

Peat or lignite is carbonised, treated with an acid or a solution of a volatile salt, and then with gluten, which is insoluble and does not penetrate into the pores of the carbon. The mixture is then moulded and heated *in vacuo* or inert gas to 800° C. The carbon may require to be washed with dilute hydrochloric acid and then again heated to 300° C. if it contains sulphides, phosphides, etc. The product is an absorptive carbon.

218,247. VULCANIZING INDIABUBBER. Naugatuck Chemical Co., Elm Street, Naugatuck, Conn., U.S.A. (Assignees of S. M. Cadwell, 200, Ames Avenue, Leonia, N.J., U.S.A.) International Convention date, June 25, 1923.

In vulcanizing indiarubber, particularly by the process described in specifications 200,788-9 (See THE CHEMICAL AGE, Vol. IX., p. 319) in which a metal in combination, an amine, sulphur, and carbon disulphide or oxysulphide are used, other substances are added to modify the action. Thus, pre-vulcanisation may be prevented, the rate of vulcanisation of various samples of rubber rendered uniform, a check may be imposed during the process, and over-vulcanisation may be prevented. Substances may be added to check the action of any of the components—*e.g.*, to react with the amine an acid anhydride, as phthalic anhydride, or nitroso bodies as *p*-nitroso-diethylaniline, *p*-nitroso-dimethylaniline, nitroso-β naphthol, or quinone, or aldehydes may be used. These additions may be made to raw rubber to make the rate of vulcanisation more uniform.

To check the action of carbon disulphide, an excess of an aliphatic amine, or ammonia, or hydrogen sulphide may be added. The metal compound may be checked by means of hydrogen sulphide or other substance which forms a less active compound, and the sulphur may be checked by an unsaturated body such as palm oil, resin, or pine tar. Many examples of the effect of these additions are given.

218,255. DYES. Farbwerke vorm. Meister, Lucius, and Brüning, Hoechst-on-Main, Germany. International Convention date, June 25, 1923.

Vat dyes are obtained from ethers of oxybenzanthrones by alkali fusion. In one example, oxynaphthoic chloride is condensed with benzene, the resulting ketone is baked with aluminium chloride, and the oxybenzanthrone methylated with dimethyl sulphate. The methoxybenzanthrone is fused with alcoholic potash, and the product isolated as usual, and purified by boiling with acetic acid or recrystallizing from nitrobenzene. Another example is given of a dye prepared from 6-methoxybenzanthrone.

LATEST NOTIFICATIONS.

220,591. Processes for treating rubber latex and compositions and articles formed thereby. American Rubber Co. August 18, 1923.

220,592. Cooling-plant of the absorption type. Amundsen, I. August 16, 1923.

220,597. Process for the production of sulphur of a high degree of dispersion. T. Goldschmidt Akt.-Ges. August 16, 1923.

220,606. Dehydration of alcohol. J. A. Steffens. August 16, 1923.

220,618. Porcelain filters. Staatliche Porzellan-Manufaktur. August 18, 1923.

220,627. Method of and apparatus for deodorising, cooling and dehydrating fluid substances. Te Aroha Dairy Co., Ltd. August 14, 1923.

220,641. Apparatus for measuring or distributing liquids. Soc. Anon. Integra. August 15, 1923.

220,650. High-pressure joints. Synthetic Ammonia and Nitrates, Ltd. August 16, 1923.

220,651. Process relating to gas purification by ammoniacal cuprous solutions. Synthetic Ammonia and Nitrates, Ltd. August 16, 1923.

220,655. Process and apparatus for treating gases bearing gaseous synthetic ammonia. Synthetic Ammonia and Nitrates, Ltd. August 16, 1923.

Specifications Accepted, with Date of Application

201,575. Anthraquinone series, Production of dyestuffs of. Farbenfabriken vorm. F. Bayer and Co. July 29, 1922.

203,340. White lead, Process for the production of. M. Rascher and R. Plaueln. September 2, 1922.

208,720. Naphthidine, Manufacture of a dysetuff from. Compagnie Nationale de Matieres Colorante et de Produits Chimiques. December 21, 1922.

215,374. Methane, Process of making. Farbwerke vorm. Meister, Lucius and Brüning. May 1, 1923.

216,478. Reaction product of acetaldehyde and aniline, Process for preparing. Naugatuck Chemical Co. May 26, 1923.

219,748. Manures. M. Igawa and Asahi Garasu Kabushiki Kaisha. January 29, 1923.

220,006. Alloys. Sir R. A. Hadfield. February 9, 1923.

220,011. Aluminium hydroxide, Manufacture of. Amber Size and Chemical Co., Ltd. (*G. Muth.*) February 27, 1923.

220,012. Tin bullion, Process of electrolytically refining. E. C. R. Marks. (*American Smelting and Refining Co.*) February 28, 1923.

220,015. Separating solids from liquids. O. Soderlund, T. Boger, N. Testrup, and Techno-Chemical Laboratories, Ltd. March 7, 1923.

220,039. Washers or purifiers, for use in the manufacture of gas. Firth, Blakeley, Sons and Co., Ltd., and J. C. Wright. May 2, 1923.

220,043. Phenol-aldehyde condensation products. H. V. Potter and Damard Lacquer Co., Ltd. May 2, 1923. Addition to 131,112.

220,059. Concentration of ores and the like, Apparatus for. F. B. Jones, B. L. Bourke, and Minerals Separation, Ltd. May 7, 1923.

220,100. Magnetic separation of materials, Method of and apparatus for. R. C. Rushen. (*F. Krupp Akt.-Ges. Grusonwerk.*) May 29, 1923.

220,119. Enclosed metallurgical furnaces. British Thomson-Houston Co., Ltd. (*General Electric Co.*) June 22, 1923.

220,157. Filtering apparatus. E. W. W. Keene. August 1, 1923.

220,195. Agglomeration of ores of a pulverulent nature, Process for. E. Poppe. October 15, 1923.

220,212. Green vat dyestuffs. Manufacture and production of. J. Y. Johnson. (*Badische Anilin and Soda Fabrik.*) December 3, 1923.

220,216. Vat dyestuffs of the anthraquinone series, Manufacture and production of. J. Y. Johnson. (*Badische Anilin and Soda Fabrik.*) December 6, 1923.

220,230. Ore pulverisers. G. E. C. Rousseau. January 21, 1924.

Applications for Patents

Austerweil, G. Preparation of thymol and menthol. 19,797. August 21. (Germany, August 21, 1923.)

Bate, S. C. Dyeing acetyl silk. 19,889. August 22.

Bird, C. J. Method of cutting metals by fusion. 19,927. August 22.

British Dyestuffs Corporation, Ltd. Dyeing acetyl silk. 19,889. August 22.

Butterworth, M. R. Preparation of tar, bitumen, etc., for roads, etc. 19,791. August 21.

California Spray-Chemical Co. Insecticides. 19,574. August 18.

Chemische Fabrik Pyrgos Ges. Manufacture of soluble starch products. 19,660. August 19. (Germany, February 21.)

Evans, E. C. Production of coke. 19,653. August 19.

Farbwerke vorm. Meister, Lucius, and Brüning. Manufacture of vat dyestuffs containing sulphur. 19,818. August 21. (Germany, September, 17, 1923.)

France, R. Manufacture of salt, etc. 19,960. August 23.

Fryer, P. J., and McDougall, I. Production of heterocyclic compounds containing nitrogen in the ring. 19,562. August 18.

Gensecke, W., and Metallbank und Metallurgische Ges. Akt.-Ges. Process of purifying oils and fats. 19,727. August 20. (Germany, September 18, 1923.)

Haller, B. Manufacture of artificial horn. 19,924. August 22. (Austria, August 23, 1923.)

Haller, R. Manufacture of soluble starch products. 19,660. August 19. (Germany, February 21.)

Johnson, J. Y. (Smith, Drum, and Co.). Agitating-devices for dye-vats, etc. 19,659. August 19.

Kiegel, J. A. Manufacture of margarine. 19,552. August 18.

Laing, B. Distillation, etc., of carbonaceous, etc., materials. 19,760. August 20.

Lenart, G. H. Manufacture of thick oil from linseed, etc., oils. 19,815. August 21.

Lepine, L. J. Apparatus for use with machines for de-sulphurising, etc., yarn. 19,861. August 22.

Morgan, J. S. Soaps, detergents, etc. 19,667. August 20.

Mumford, G. Preparation of tar, bitumen, etc., for roads, etc. 19,791. August 21.

Peel, F., and W. J. Fraser and Co., Ltd. Production of solid blocks from plastic material. 19,668. August 20.

Perkin, W. H. Dyeing acetyl silk. 19,889. August 22.

Perkins, W. G. Leaching ores, etc. 19,910. August 22.

Ransford, R. B. (Cassella and Co. Ges.). Dyeing. 19,733. August 20.

Sakurai, S., and Suzuki, T. Process of producing an acid and its salts strongly absorbing ultra-violet ray. 19,568. August 18.

Skola, V. Manufacture of magnesium borosilicate glass. 19,768. August 20.

Soc. Chimique des Usines du Rhône. Reduction of halogenated carbides. 19,740. August 20. (France, November 21, 1923.)

Soc. of Chemical Industry in Basle. Manufacture of artificial shellac. 19,817. August 21. (Switzerland, August 30, 1923.)

Sulzer Frères Soc. Anon. Tar distillation apparatus. 19,703. August 20. (Switzerland, December 15, 1923.)

Synthetic Ammonia and Nitrates, Ltd. Treating gases bearing gaseous synthetic ammonia. 19,511. August 18. (United States, August 16, 1923.)

Thomas, W. Manufacture of ammonia. 19,655. August 19.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing those firms' independent and impartial opinions.*

London, August 28, 1924.

BUSINESS has been rather better during the past week, and there are signs of a definite improvement as the holiday season wanes. There is a fair inquiry for export.

General Chemicals

ACETONE is in steady demand. Price is £100 per ton, but can be fractionally shaded for quantities.

ACID ACETIC is much firmer and makers have withdrawn their quotations for forward delivery. An advance in price seems to be imminent.

ACID CITRIC is in very fair demand and the tendency is in buyers' favour.

ACID FORMIC is fairly active. Price unchanged at about £55 per ton for 85%.

ACID LACTIC is quiet, 50% vol being £38 per ton and 50% by weight £43 per ton.

ALUMINA SULPHATE.—The demand is much below normal and makers seem to find much difficulty in getting rid of their production. 17/18% is about £7 10s. per ton.

ARSENIC is decidedly firmer being quoted at £46 per ton.

BARIUM CHLORIDE continues fairly active. Price is £14 to £14 10s. per ton.

COPPER SULPHATE.—Inquiry is slightly developing. Price is about £23 per ton.

CREAM OF TARTAR is rather easier and is quoted at 80s. per cwt., less 2½%.

FORMALDEHYDE.—Price still sags. Business in quantity has been done below £52 per ton.

LEAD ACETATE is firmer at £47 10s. per ton.

LIME ACETATE is still a drug on the market, price nominally £19 to £19 10s. per ton.

METHYL ALCOHOL is in much better demand. Price varies widely between about £60 and £68 per ton, according to quality and consumer.

POTASH CAUSTIC is quiet and uninteresting. Price £27 10s. to £28 per ton.

POTASH PERMANGANATE is slow of sale and for important quantities the price of 7½d. per lb. is shaded.

POTASH PRUSSIATE is slightly on the up grade, price being from 7¾d. to 8d. per lb.

SODA ACETATE has been in rather better demand and is quoted at £24 per ton.

SODA HYPOSULPHITE.—Unchanged at £9 10s. per ton for the commercial quality.

SODA NITRITE is in fair demand, price £25 10s. to £26 per ton.

SODA PRUSSIATE.—Some buyers have been in evidence, although the turnover is still very small. Business has been done at 4¼d. per lb.

SODIUM SULPHIDE.—Unchanged at £14 per ton for 60/62%.

Coal Tar Products

There is little change to report in the market for coal tar products.

90% BENZOL remains unchanged at 1s. 6½d. to 1s. 7d. per gallon on rails.

PURE BENZOL is steady at 1s. 11d. to 1s. 11½d. per gallon on rails.

CREOSOTE OIL is steady at 5½d. to 5¾d. per gallon on rails in the north, and at 6d. to 6¼d. in London.

CRESYLIC ACID remains steady at 2s. per gallon on rails for the pale 97/99% quality, the dark 95/97% material being worth 1s. 8d. to 1s. 9d. per gallon on rails.

SOLVENT NAPHTHA remains unchanged at 11d. to 1s. per gallon on rails.

HEAVY NAPHTHA is quoted at 1s. to 1s. 1d. per gallon on rails.

NAPHTHALENE.—The lower grades are worth from £4 10s. to £5 per ton on rails, while the higher grades, 76/78 are worth £7 10s. per ton and 74/76 from £6 to £6 10s. per ton.

PITCH remains dull and prices are unchanged.

Nitrogen Products Market

SINCE our market report of August 20 the upward tendency of sulphate of ammonia prices has been well maintained and prices have hardened to £13 5s. to £13 10s. for prompt and £14 to £14 10s. per ton for forward delivery, f.o.b. U.K. port. In view of the poor crop returns which are coming in from most countries and the increased area which the United States propose to plant under cotton, it is expected that the consumption of nitrogen will increase very largely this season and producers are expecting to receive much higher prices in the spring.

Home trade prices are now announced for September and October at 2s. per ton per month in advance of August prices, September being quoted at £14 2s. and October £14 4s. per ton for 21·1 per cent. nitrogen, neutral quality, delivered to consumer's nearest railway station.

The nitrate of soda market is unchanged; prices range from about £11 10s. to £12 per ton for cargo lots, c.i.f. chief European ports.

Decline of U.S.A. Ammonia Liquor Market

THERE is a feeling among American gas and coke producers, who have been accustomed to market their ammonia in the form of liquor, that the demand for liquid ammonia is rapidly decreasing. They are (according to *Chemical and Metallurgical Engineering*) several plants, either built or building, making ammonia by synthetic processes, and these plants will market liquid ammonia, which will then replace an equal amount of the ammonia previously made from gasworks liquor. The synthetic air ammonia industry is just beginning in the United States. It may not be long until the entire liquid ammonia market can readily be supplied from this source. Hence it will be a very important problem for the coal-gas manager to determine what he is going to do with his by-product ammonia when such time comes. High costs of synthetic ammonia for the present prevents the rapid extension of these plants; but it is none too soon to study a problem that is sure to become serious within a few years, and in some parts of the country, at least, to reach serious proportions. One of the most obvious remedies is to make ammonium sulphate instead of ammonia liquor, or the synthetic plants will probably not successfully compete in this field for some time.

Reduced Prices of Bismuth Salts

MAY AND BAKER, LTD., manufacturing chemists, Battersea, announce a considerable reduction in the prices of bismuth salts, by reason of the cheaper market for bismuth metal. The quantity prices are as under and apply only for cash terms; smaller quantities are charged extra.

	Under 1 cwt.	Not less than 1 cwt.
Bismuth Carbonate	11/–	10/9 lb.
,, Citrate	10/9	10/6 ,,
,, Nitrate Cryst	6/–	5/9 ,,
,, Oxide	12/4	12/1 ,,
,, Salicylate	9/6	9/3 ,,
,, Subchloride	11/–	10/9 ,,
,, Subgallate	8/6	8/3 ,,
,, Subnitrate	9/2	8/11 ,,

Quantities of 2 cwt. and upwards, for prompt delivery or deliverable over three months, are subject to rebate of 3d. per lb. on completion. The various salts may be taken in assorted quantities if so required.

LIQUOR BISMUTHI P.B. in W.Qts., 1/2 lb.; 12 W.Qts., 1/1 lb.; 36 W.Qts., 1/0½ lb.

Swiss Chemical Exports

THE chemical industry in Switzerland during the first six months of this year shows an increase in the majority of its exports, the most notable being: aniline dyes, 2,353, against 1,999 tons; carburate of calcium, 4,866, against 1,628 tons; and indigo, 2,063 tons in the first half of the present year, as compared with 1,750 tons in the first six months of last year.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at sellers' works.

General Heavy Chemicals

Acid Acetic 40% Tech.—£23 10s. per ton.

Acid Boric, Commercial.—Crystal, £45 per ton. Powder, £47 per ton.

Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.

Acid Nitric 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.

Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.

Bleaching Powder.—Spot, £11 d/d.; Contract, £10 d/d. 4 ton lots.

Bisulphite of Lime.—£7 per ton, packages extra.

Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

Calcium Chloride.—£5 17s. 6d. per ton d/d.

Copper Sulphate.—£25 per ton.

Methylated Spirit 64 O.P.—Industrial, 3s. 1d. to 3s. 5d. per gall. Mineralised, 4s. 2d. to 4s. 6d. per gall., in each case according to quantity.

Nickel Sulphate.—£38 per ton d/d. Normal business.

Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.

Potash Caustic.—£30 to £33 per ton.

Potassium Bichromate.—5¾d. per lb.

Potassium Chlorate.—3d. to 4d. per lb.

Salammoniac.—£32 per ton d/d.

Salt Cake.—£3 10s. per ton d/d.

Soda Caustic, Solid.—Spot lots delivered, £16 7s. 6d. to £19 7s. 6d. per ton, according to strength; 20s. less for contracts.

Soda Crystals.—£5 5s. to £5 10s. per ton ex railway depots or ports.

Sodium Acetate 97/98%.—£24 per ton.

Sodium Bicarbonate.—£10 10s. per ton carr. paid.

Sodium Bichromate.—4½d. per lb.

Sodium Bisulphite Powder 60/62%.—£18 to £19 per ton according to quantity, f.o.b., 1-cwt. iron drums included.

Sodium Chlorate.—3d. per lb.

Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.

Sodium Nitrite 100% basis.—£27 per ton d/d.

Sodium Sulphide conc. 60/65.—About £14 10s. per ton d/d.

Sodium Sulphide Crystals.—£9 per ton d/d.

Sodium Sulphite, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—6½d. per lb. Quiet. Crude 60's, 1s. 9d. to 1s. 11d. per gall., according to district. Still quiet.

Acid Cresylic 97/99.—2s. to 2s. 1d. per gall. Demand fair. Pale 95%, 1s. 10d. to 2s. per gall. Fair demand. Dark, 1s. 9d. to 2s per gall. Quiet.

Anthracene Paste 40%.—4d. per unit per cwt. Nominal price. No business.

Anthracene Oil, Strained.—7½d. to 9d. per gall. Quiet. Unstrained, 7d. to 7½d. per gall.

Benzol.—Crude 65's.—10½d. to 1s. per gall., ex works in tank wagons. Standard Motor, 1s. 4½d. to 1s. 6d. per gall., ex works in tank wagons. Pure, 1s. 8½d. to 1s. 10d. per gall., ex works in tank wagons.

Toluol.—90%, 1s. 5d. to 1s. 5½d. per gall. Pure, 1s. 8d. to 2s. per gall.

Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.

Creosote.—Cresylic, 20/24%, 8½d. per gall. Not much business. Middle Oil, Heavy, Standard specification, 5½d. to 6d. per gall., according to quality and district. Small export inquiry. Fair demand.

Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 11½d. to 1s. 3d. per gall., according to district. Fair demand. Solvent 90/190, 11½d. to 1s. 1½d. per gall. Demand maintained.

Naphthalene Crude.—Market dull. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £4 to £6 per ton. Quiet. Whizzed or hot pressed, £7 to £9 per ton.

Naphthalene.—Crystals and Flaked, £13 to £16 per ton in Yorkshire and London respectively.

Pitch.—Medium soft, 55s. to 60s. per ton, f.a.s. for next season. Frequent inquiries.

Pyridine.—90/160, 19s. per gall. Again dearer. Market firm. Heavy, 12s to 12s. 6d. Little business.

Intermediates and Dyes

Business in dyestuffs has not been good lately, but an improvement is expected after the holidays. Prices remain firm.

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.

Acid H.—4s. per lb. 100% basis d/d.

Acid Naphthionic.—2s. 4d. per lb. 100% basis d/d

Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.

Acid Salicylic, technical.—1s. 1d. per lb. Improved demand.

Acid Sulphanilic.—9½d. per lb. 100% basis d/d.

Aluminium Chloride, anhydrous.—1s. per lb. d/d.

Aniline Oil.—7¾d. to 8½d. per lb. naked at works.

Aniline Salts.—7¾d. to 9d. per lb. naked at works.

Antimony Pentachloride.—1s. per lb. d/d.

Benzidine Base.—4s. 6d. per lb. 100% basis d/d.

Benzyl Chloride 95%.—1s. 1d. per lb.

***p*-Chlorphenol.**—4s. 3d. per lb. d/d.

***p*-Chloraniline.**—3s. per lb. 100% basis.

***o*-Cresol 19/31° C.**—4½d. per lb. Demand steady.

***m*-Cresol 98/100%.**—2s. 1d. to 2s. 3d. per lb. Demand moderate.

***p*-Cresol 32/34° C.**—2s. 1d. to 2s. 3d. per lb. Demand moderate.

Dichloraniline.—2s. 3d. to 3s. per lb.

Dichloraniline S. Acid.—2s. 6d. per lb. 100% basis.

***p*-Dichlorbenzol.**—£85 per ton.

Diethylaniline.—4s. 6d. per lb. d/d., packages extra, returnable.

Dimethyaniline.—2s. 3d. per lb. d/d. Drums extra.

Dinitrobenzene.—9d. per lb. naked at works.

Dinitrochlorbenzol.—£84 10s. per ton d/d.

Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works 66/68° C. 1s. 2d. per lb. naked at works.

Diphenylaniline.—2s. 10d. per lb. d/d.

Monochlorbenzol.—£63 per ton.

***B*-Naphthol.**—1s. 1d. per lb. d/d.

***a*-Naphthylamine.**—1s. 4d. per lb. d/d.

***B*-Naphthylamine.**—4s. per lb. d/d.

***m*-Nitraniline.**—4s. 9d. per lb. d/d.

***p*-Nitraniline.**—2s. 3½d. per lb. d/d.

Nitrobenzene.—5½d. to 5¾d. per lb. naked at works.

***o*-Nitrochlorbenzol.**—2s. per lb. 100% basis d/d.

Nitronapthalene.—10½d. per lb. d/d.

***p*-Nitrophenol.**—1s. 9d. per lb. 100 % basis d/d.

***p*-Nitro-*o*-amido-phenol.**—4s. 6d. per lb. 100% basis.

***m*-Phenylene Diamine.**—4s. per lb. d/d.

***p*-Phenylene Diamine.**—10s. 3d. per lb. 100% basis d/d.

R. Salt.—2s. 6d. per lb. 100% basis d/d.

Sodium Naphthionate.—2s. 3d. per lb. 100% basis d/d.

***o*-Toluidine.**—8½d. per lb.

***p*-Toluidine.**—3s. 3d. per lb. naked at works.

***m*-Toluylene Diamine.**—4s. 3d. per lb. d/d.

Wood Distillation Products

"Summer conditions" prevail in this as in most industries.

Acetate of Lime.—Brown, £12 to £12 5s. per ton d/d. Grey, £17 to £18 per ton. Market easier. Liquor, 9d. per gall. 32° Tw.

Charcoal.—£7 10s. to £9 per ton, according to grade and locality. Demand fairly good.

Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.

Red Liquor.—10d. to 1s. per gall. 14/15° Tw.

Wood Creosote.—2s. 7d. per gall. Unrefined.

Wood Naphtha, Miscible.—4s 10d. to 5s. per gall. 60% O.P. Market dull. Solvent, 5s. 6d. per gall. 40% O.P. Fairly good demand

Wood Tar.—£4 per ton. Cheaper.

Brown Sugar of Lead.—£44 per ton.

Rubber Chemicals

Antimony Sulphide.—Golden, 5¾d. to 1s. 4d. per lb., according to quality. Crimson, 1s. 3d. to 1s. 6d. per lb., according to quality.

Arsenic Sulphide, Yellow.—1s. 11d. per lb.

Barytes.—£3 10s. to £6 15s. per ton, according to quality.

Cadmium Sulphide.—3s. 9d. to 4s. per lb., according to quantity.

Carbon Bisulphide.—£30 to £33 per ton, according to quantity. Again dearer.

Carbon Black.—7d. to 7½d. per lb., ex-wharf. Dearer.

Carbon Tetrachloride.—£60 to £65 per ton, according to quantity, drums extra. Again dearer.

Chromium Oxide, Green.—1s. 3d. per lb.

Indiarubber Substitutes, White and Dark.—5d. to 9½d. per lb. Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.

Lamp Black.—£48 per ton, barrels free.

Lead Hyposulphite.—7½d. per lb.
Lithopone, 30%.—£22 10s. per ton.
Mineral Rubber "Rubpron."—£16 5s. per ton f.o.r. London.
Sulphur.—£10 to £12 per ton, according to quality.
Sulphur Chloride.—4d. per lb., carboys extra. Dearer.
Thiocarbanilide.—2s. 6d. per lb.
Vermilion, Pale or Deep.—5s. 1d. per lb. Dearer.
Zinc Sulphide.—7½d. to 1s. 8d. per lb., according to quality

Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£45 per ton.
Acid, Acetyl Salicylic.—3s. 2d. to 3s. 5d. according to quality. Good demand. Price firm.
Acid, Benzoic B.P.—3s. to 3s. 6d. per lb.
Acid, Boric B.P.—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—10s. to 21s. per lb.
Acid, Citric.—1s. 4½d. to 1s. 5d. per lb., less 5% for ton lots. Market very weak.
Acid, Gallic.—3s. per lb. for pure crystal.
Acid, Pyrogallic, Crystals.—6s. 9d. per lb. for 1 cwt. lots. Market firm. Increasing demand.
Acid, Salicylic.—1s. 6d. to 1s. 9d. per lb. Market unsettled and difficult.
Acid, Tannic B.P.—3s. per lb. Market quiet.
Acid, Tartaric.—1s. 1½d. per lb., less 5%.
Amidol.—9s. per lb. d/d.
Acetanilide.—2s. 1d. to 2s. 3d. per lb. for quantity. Demand slow.
Amidopyrin.—13s. 3d. per lb. Neglected. Stocks low.
Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb. according to quantity.
Ammonium Carbonate B.P.—£37 per ton.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—15s. to 15s. 6d. per lb. Quiet market.
Benzonaphthol.—5s. 3d. per lb. Small inquiry.
Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
Bismuth Carbonate.—10s. 6d. to 12s. 6d. per lb.
Bismuth Citrate.—10s. 3d. to 12s. 3d. per lb.
Bismuth Salicylate.—9s. 0d. to 11s. 0d. per lb.
Bismuth Subnitrate.—9s. 8d. to 10s. 8d. per lb.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 1d. to 1s. 3d. per lb.; sodium, 1s. 2d. to 1s. 4d. per lb.; ammonium, 1s. 3d. to 1s. 5d. per lb. Unsettled. Spot supplies short, raw materials dearer, market very firm and advancing.
Calcium Lactate.—Market fairly firm and higher prices talked of. Good English make can be had from 1s. 6d. upwards.
Chloral Hydrate.—4s. to 4s. 3d. per lb. Very firm and scarce.
Chloroform.—2s. per lb. for cwt. lots. Very steady.
Creosote Carbonate.—6s. 6d. per lb. Little demand.
Formaldehyde.—£54 per ton, ex works. English make in casks. About 8s. per cwt. extra for carboys.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
Guaiacol Carbonate.—10s. 6d. to 11s. 3d. per lb.
Hexamine.—3s. 6d. per lb. for English make. Market quiet and steady.
Homatropine Hydrobromide.—30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydroquinone.—4s. 3d. per lb. in cwt. lots. Foreign make.
Hypophosphites.—Calcium, 3s. 6d. per lb. for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—2s. 1d. to 2s. 5d. per lb., according to quantity.
Magnesium Carbonate.—Light Commercial, £36 per ton net.
Magnesium Oxide.—Light Commercial, £75 per ton, less 2½%; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 1s. 6d. to 2s. per lb., according to quantity. Steady market.
Menthol.—A.B.R. recrystallised B.P., 62s. 6d. per lb. Market rising rapidly. Synthetic, 26s. to 35s. per lb., according to quantity. English make. Strong demand.
Mercurials.—Market flat. Red oxide, 5s. 3d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 6d. to 3s. 7d. per lb.; white precipitate, 4s. 7d. to 4s. 8d. per lb.; Calomel, 3s. 11d. to 4s. per lb.
Methyl Salicylate.—1s. 10d. to 2s. 1d. per lb. Keen competition.
Methyl Sulphonel.—26s. per lb.
Metol.—11s. per lb. British make.
Morphine and Salts.—Reduced by 1s. to 1s. 3d. per oz.
Paraformaldehyde.—2s. 10½d. to 3s. per lb. Not very active.
Paraldehyde.—1s. 5d. to 1s. 6d. per lb. in free bottles and cases.
Phenacetin.—6s. to 6s. 3d. per lb. Price and demand steady.
Phenazone.—7s. 6d. A shade firmer. Forward prices higher.
Phenolphthalein.—6s. 6d. per lb. Ample supplies.
Potassium Bitartrate 99/100% (Cream of Tartar).—88s. per cwt. less 2½% for ton lots. Firm market. Prices have upward tendency.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb. Dearer.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Demand continues heavy.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8½d. per lb., carriage paid. Keen competition keeps prices low.
Quinine Sulphate.—2s. 3d. per oz., in 100 oz. tins. Very heavy demand.
Resorcin.—5s. 2d. per lb.
Saccharin.—63s. per lb. in 50-lb. lots.
Salol.—3s. 6d. per lb.
Silver Proteinate.—9s. 6d. per lb.
Sodium Benzoate, B.P.—2s. 9d. per lb. Ample supplies B.P. quality available.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
Sodium Hypophosphite, Photographic.—£13 to £15 per ton. according to quantity, d/d. consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb. Less for quantity.
Sodium Potassium Tartrate (Rochelle Salt).—75s. to 82s. 6d. per cwt., according to quantity. Market steady, good demand.
Sodium Salicylate.—Powder, 2s. 3d. to 2s. 5d. per lb. Crystal, 2s. 5d. to 2s. 7d. per lb. Flake, 2s. 9d. per lb. Market more active.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb., according to quantity.
Sodium Sulphite, anhydrous, £27 10s. to £28 10s. per ton, according to quantity, 1 cwt. kegs included. In large casks £1 per ton less.
Thymol.—19s. 6d. per lb. Nominal. Very scarce indeed. Still rising.

Perfumery Chemicals

Acetophenone.—12s. 6d. per lb.
Aubepine.—15s. 3d. per lb. Advanced.
Amyl Acetate.—2s. 9d. per lb.
Amyl Butyrate.—6s. 9d. per lb.
Amyl Salicylate.—3s. per lb.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 10½d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 10½d. per lb.
Benzaldehyde free from Chlorine.—3s. 6d. per lb.
Benzyl Benzoate.—3s. 6d. per lb.
Cinnamic Aldehyde Natural.—16s. per lb. Advanced.
Coumarin.—19s. 6d. per lb. Cheaper.
Citronellol.—17s. per lb Again advanced.
Citral.—9s. to 9s. 6d. per lb. Price reduction due to selling competition.
Ethyl Cinnamate.—13s. 6d. per lb. Cheaper
Ethyl Phthalate.—3s. 3d. per lb.
Eugenol.—10s. 6d. per lb. Cheaper.
Geraniol (Palmarosa).—35s. per lb.
Geraniol.—11s. to 18s. 6d. per lb.
Heliotropine.—7s. 9d. per lb. Advanced
Iso Eugenol.—15s. 9d. per lb.
Linalol ex Bois de Rose.—26s. per lb.
Linalyl Acetate.—26s. per lb.
Methyl Anthranilate.—9s. 6d. per lb.
Methyl Benzoate.—6s. per lb.
Musk Ambrette.—45s. per lb. Cheaper.
Musk Xylol.—14s. per lb. Again cheaper.
Nerolin.—4s. 9d. per lb. Advanced.
Phenyl Ethyl Acetate.—15s. per lb. Advanced.
Phenyl Ethyl Alcohol.—16s. per lb.
Rhodinol.—57s. 6d. per lb.
Safrol.—1s. 10d. per lb.
Terpineol.—2s. 4d. per lb. Cheaper.
Vanillin.—26s. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—15s. 6d. per lb.
Anise Oil.—2s. 6d. per lb. Cheaper.
Bergamot Oil.—17s. 6d. per lb. Again firmer.
Bourbon Geranium Oil.—36s. 6d. per lb.
Camphor Oil.—75s. per cwt.
Cananga Oil, Java.—10s. 6d. per lb.
Cinnamon Oil, Leaf.—6½d. per oz.
Cassia Oil, 80/85%.—9s. 6d. per lb. Advanced.
Citronella Oil.—Java, 85/90%, 5s. 8d. per lb. Cheaper. Ceylon, 3s. 7d. per lb.
Clove Oil.—8s. per lb. Firmer.
Eucalyptus Oil, 70/75%.—2s. 4½d. per lb. Advanced.
Lavender Oil.—French 38/40% Esters, 30s. per lb. Very firm. Higher prices expected owing to bad crops.
Lemon Oil.—3s. per lb.
Lemongrass Oil.—3d. per oz.
Orange Oil, Sweet.—13s. per lb.
Otto of Rose Oil.—Bulgarian, 37s. 6d. per oz. Production below normal. Anatolian, 18s. per oz.
Palma Rosa Oil.—18s. per lb. Cheaper.
Peppermint Oil.—Wayne County, 21s. 6d. per lb. Japanese, 17s. 3d. per lb. Nominal. Market rising rapidly.
Petitgrain Oil.—9s. 3d. per lb. Cheaper.
Sandal Wood Oil.—Mysore, 26s. 6d. per lb. Australian, 21s. per lb.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, August 28, 1924.

DURING the past week business in the Heavy Chemical Market has shown a little improvement, quite a considerable number of inquiries having been received, and the proportion of orders booked quite good. Owing to the rather obscure position regarding the amendment of the amount of Reparations Duty payable on goods imported from Germany, prices of Continental products are inclined to be higher. In some articles, notably potashes, the prices named by Continental merchants show an advance of nearly £2 per ton on prices ruling recently. Prices for spot parcels are in consequence higher.

Industrial Chemicals

ACID ACETIC.—Glacial, 98/100%, £58/£68 per ton; 80% pure, £45/£47 per ton; 80% technical, £43/45 per ton. All packed in casks, delivered c.i.f. U.K. port, duty free.

ACID BORACIC.—Crystal or granulated, £45 per ton; powdered, £47 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC ICE CRYSTALS.—In little demand, 6½d. per lb. but could probably be obtained for less.

ACID CITRIC, B.P. CRYSTALS.—Remain unchanged and about 1s. 5½d. per lb., less 5% ex store, spot delivery. Offered for prompt shipment from the continent at 1s. 5d. per lb., less 5%, ex wharf.

ACID FORMIC, 85%.—Quoted £55 10s. per ton, ex store. Offered for prompt shipment from the continent at about £53 10s. per ton, ex wharf.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC, 98/100%.—Now quoted 4½d. per lb., ex store. Offered from the continent at about 4d. per lb., c.i.f. U.K. port.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Unchanged at about 1s. 1½d. per lb., less 5% ex store, spot delivery. Offered for early delivery from the continent at about 1s. 1d. per lb., less 5% ex wharf.

ALUMINA SULPHATE, 17/18% IRON FREE.—Spot lots unchanged at £8 per ton, ex store. Quoted £7 5s. per ton, c.i.f. U.K. port, prompt shipment.

ALUM.—Ammonium chrome alum quoted £19 10s. to £21 10s. per ton according to quality, f.o.b. U.K. port. Potash chrome alum quoted £27 per ton, ex store. Lump potash alum now on offer from the continent at about £8 10s. per ton, c.i.f. U.K. port. Spot lots quoted £9 15s. per ton, ex store.

AMMONIA, ANHYDROUS.—In little demand and price unchanged at about 1s. 6d. per lb., ex station, containers extra and returnable.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks delivered U.K. port.

AMMONIA LIQUID, 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantity, containers extra.

AMMONIA MURIATE.—Grey galvanisers quality unchanged at £30 per ton, ex station; fine white crystals of English manufacture quoted £37 per ton f.o.b. U.K. port; fine white crystals offered from the continent at £24 10s. per ton, c.i.f. U.K. port.

ARSENIC, WHITE POWDERED.—In little demand. Spot lots quoted £53 10s. per ton, ex store, but could probably be obtained for less.

BARIUM CARBONATE, 98/100%.—On offer from the continent at about £11 15s. per ton, c.i.f. U.K. port; 97/99% quality 15s. per ton less.

BARIUM CHLORIDE, 98/100%.—Rather higher quotations from the continent; quoted £13 per ton, c.i.f. U.K. port for powdered; £13 15s. per ton for crystals.

BARYTES.—English material unchanged at £5 5s. per ton, ex works; continental quoted £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station; contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station; continental on offer at £4 17s. 6d. per ton, c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £3 per ton, ex works, packed in casks free.

COPPER SULPHATE.—Quoted £24 per ton, f.o.b. U.K. port for export. Continental material on offer at £23 5s. per ton, ex quay.

FORMALDEHYDE, 40%.—Spot lots unchanged at £53 10s. per ton, ex store. Offered for prompt shipment from America at £50 per ton, c.i.f. U.K. port.

GLAUBER SALTS.—English material quoted £4 per ton, ex store or station. Fine white crystals offered from the continent at £3 5s. per ton, c.i.f. U.K. port. Large crystals 10s. per ton extra.

LEAD, RED.—Imported material on offer at £41, ex store, spot delivery.

LEAD, WHITE.—Quoted £44 per ton, ex store, spot delivery.

LEAD ACETATE.—Rather cheaper quotations from the continent. Refined white crystals quoted £44 10s. per ton, c.i.f. U.K. port; brown, £39 per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—Unchanged at about £7 17s. 6d. per ton, ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton, ex station; finer quality of continental manufacture quoted £7 15s. per ton, c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Higher quotations from the continent. Now quoted £4 per ton, c.i.f. U.K. port. Spot material on offer at £4 10s. per ton, ex store.

POTASH CAUSTIC, 88 92%.—Higher quotations from the continent. Now quoted £29 10s. per ton, c.i.f. U.K. port. Spot lots still available at £30 10s. per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5½d. per lb. delivered.

POTASSIUM CARBONATE.—Offered from the continent at £23 10s. per ton, c.i.f. U.K. port. Spot lots on offer at £26 per ton, ex store.

POTASSIUM CHLORATE.—Offered for prompt shipment from the continent at about 2¾d. per lb., ex wharf. Spot lots quoted 3d. per lb., ex store.

POTASSIUM NITRATE (SALTPETRE).—Spot lots quoted £29 per ton, ex store. Offered from the continent at £26 per ton, c.i.f. U.K. port.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 8½d. per lb., ex store, commercial quality on offer at 6½d. per lb., ex wharf, prompt shipment from the continent.

POTASSIUM PRUSSIATE (YELLOW).—In little demand. Quoted 7½d. per lb., ex store.

SODA, CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex station spot delivery, contracts 20s. per ton less.

SODIUM ACETATE.—Quoted £23 per ton, c.i.f. U.K. port, prompt shipment from the continent. Spot lots on offer at £24 per ton, ex store.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4¼d. per lb., delivered.

SODIUM CARBONATE, SODA CRYSTALS.—£5 per ton to £5 5s. per ton, ex quay or station. Alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material quoted £10 per ton, ex station. Rather cheaper offers from the continent. Now quoted £8 5s. per ton, c.i.f. U.K. ports. Spot lots on offer at about £9 15s. per ton, ex store. Pea crystals of English manufacture unchanged at £13 15s. per ton, ex station.

SODIUM NITRATE.—Ordinary quality unchanged at £13 10s. per ton, ex store. 96/98% refined quality 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Now quoted £26 10s. per ton, ex store spot delivery.

SODIUM PRUSSIATE (YELLOW).—In little demand. Quoted 4¼d. per lb., ex station or f.o.b. U.K. port.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption £3 10s. per ton, carriage paid buyers' station. Good inquiry for export and price about £3 per ton, f.o.b. U.K. port.

SODIUM SULPHIDE.—60/65%, solid, of English manufacture, £14 15s. per ton, ex station; broken, £1 per ton more; flake, £2 per ton more; 60/62%, solid, offered from the continent at £12 10s. per ton, c.i.f. U.K. port; broken, £1 2s. 6d. per ton extra; 31/34% crystals of English manufacture, £9 2s. 6d. per ton, ex station. 30/32% crystals, offered from the continent at £8 12s. 6d. per ton, c.i.f. U.K. port.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton, ex store. Prices nominal.

ZINC CHLORIDE.—98/100% solid, offered from the continent at about £24 5s. per ton, c.i.f. U.K. port. 96/98% quoted £23 10s. per ton, c.i.f. U.K. port. English material for export about £27 5s. per ton, f.o.b. U.K. port.

ZINC SULPHATE.—English material quoted £14 per ton, ex station; continental inclined to be higher at about £11 10s. per ton, c.i.f. U.K. port.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

BENZALDEHYDE.—Good home inquiry. Price quoted 2s. 2d. per lb., delivered, drums returnable.

BENZOYL SUPER OXIDE.—Good home inquiry. Price quoted 9s. per lb., delivered.

BENZOYL PEROXIDE.—Some export inquiry. Offered at 9s. per lb., f.o.b.

BETA NAPTHOL R.—Some home inquiry. Price 1s. 4d. per lb., carriage paid.

BETA METHYL ANTHRAQUINONE.—Some export inquiry. Offered at 12s. 2d. per lb., f.o.b.

BENZIDINE BASE.—Some inquiry for home trade. Offered at 4s. per lb., 100% basis, carriage paid.

DINITROCHLORBENZOL.—Export inquiry. Price £90 per ton, drums included, f.o.b.

METAPHENYLENEDIAMINE.—Export inquiry. Offered at 3s. 11d. per lb., f.o.b.

METANITRANILINE.—Inquiry for home trade. Price 4s. 3d. per lb., delivered.

NAPTHIONIC ACID.—Some home inquiry. Offered at 2s. 5d. per lb., 100% basis, delivered.

PARATOLUYLBENZOIC ACID.—Export inquiry. Offered at 6s. 6½d. per lb.

PARAPHENYLENEDIAMINE BASE.—Some inquiry. Price quoted 10s. 2d. per lb., 100% basis, delivered.

PHENYLPERI ACID.—Some inquiry for home trade. Price 5s. per lb., 100% basis, delivered, packages returnable.

The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

Manchester, August 28, 1924.

ALTHOUGH little actual improvement in the demand has occurred there is a rather more hopeful tone in the chemical market here—possibly a reflection of the growing optimism in the cotton trade. As far as home business is concerned the future of the chemical trade is largely bound up with that of cotton textiles, and if the long-awaited improvement in the Lancashire cotton trade does take place, as is expected in some quarters, chemicals will very quickly benefit. Foreign demand is on quiet lines, and a small business has been done on Continental account. On the whole prices are steadier.

Heavy Chemicals

Prussiate of soda is still offering at round 4d. per lb., but the demand for this material is said to be a little brisker. Hyposulphite of soda is attracting only moderate attention, but values are steady at £14 5s. per ton for photographic crystals and £9 10s. for commercial quality. Saltcake is rather quiet at £3 10s. per ton. Caustic soda continues in fair request for both branches of trade, and values still range from £16 17s. 6d. per ton for 60 per cent. material to £19 7s. 6d. for 76-77 per cent. Glauber salts are quoted at £3 10s. per ton, but the demand is subdued. Acetate of soda meets with a quiet demand at about £23 per ton. Sodium sulphide is steadier and in fair request at £14 10s. per ton for 60-65 per cent. concentrated solid and £9 10s. per ton for crystals. Soda crystals are rather quiet at £5 5s. per ton. Values of chlorate of soda are maintained at 2½d. to 2¾d. per lb., a moderate amount of business being put through. Bleaching powder is steady and in fair inquiry at £10 per ton. Phosphate of soda has been selling slowly and values are unchanged at £13 10s. to £14 per ton. Bicarbonate of soda keeps firm and in fair demand at £10 10s. per ton. Alkali continues to meet with a quietly steady inquiry both for home consumption and shipment, and quotations are maintained at round £6 15s. per ton. Bichromate of soda is still offering at 4¼d. per lb.

Caustic potash has improved a little and values are slightly firmer, £28 10s. to £29 per ton now being quoted for 90 per cent. material. Carbonate of potash is now quoted at £23 10s. per ton, but business is only moderate. Bichromate of potash is steady at 5½d. per lb., a quietly steady demand being met with. Yellow prussiate of potash is selling a shade more freely than it has been of late, and current quotations are steady at round 7¼d. per lb. Permanganate of potash is unchanged in position or value at 7d. to 8d. per lb. according to quality. Chlorate of potash meets with a moderate inquiry at 2¾d. per lb.

Arsenic is maintained at the recent level of £48 per ton Manchester for white powdered, Cornish makes; a slight improvement in the volume of export inquiry has been reported. Sulphate of copper remains a very slow section of the market at £24 10s. to £25 per ton, f.o.b. Commercial Epsom salts are finding a fair number of buyers at £4 10s. to £4 15s. per ton, with magnesium sulphate, B.P. quality, still offering at round £6 10s. per ton. Nitrate of lead is selling only in small parcels, but the price still hovers between £41 and £42 per ton. Acetate of lead is also quiet at £46 for white and £44 per ton for brown. Acetate of lime is only in moderate demand, but values are fairly steady at £16 to £17 per ton for grey and £11 10s. for brown.

Acids and Tar Products

Tartaric acid continues quiet but about unchanged from last week at 1s. 1d. to 1s. 1½d. per lb. Citric acid is in much the same position, with current values at 1s. 5d. to 1s. 5½d. per lb. Acetic acid is in slow demand at £42 to £43 for 80 per cent. technical and £68 for glacial. Oxalic acid is still dull at 4¼d. per lb.

Carbolic acid continues featureless and values are easy at 6d. to 6¼d. per lb. for crystal and 1s. 10d. per gallon for crude. Pitch is more or less nominal at £2 15s. to £3 per ton. Solvent naphtha is quiet and weak at about 1s. 2¼d. per gallon. Naphthalenes are in small demand, but values are about unchanged at £16 to £17 per ton for refined and £5 and upwards for crude qualities. Creosote oil is still quoted at 5¼d. to 6d. per gallon.

Chemical Merchants' Failure

THE first meeting of creditors under a receiving order made against Louis Augustus Mangold and Charles Bernard Mangold, trading as Mangold Bros., chemical merchants, of 17, Harp Lane, London, E.C., was held on Tuesday at the London Bankruptcy Court, Mr. F. T. Garton, Official Receiver, presiding. A statement showed gross liabilities £7,078, of which £5,656 was expected to rank for dividend, and net assets valued at £1,146. According to the deficiency account the business was carried on at a loss of £3,728 from November, 1922, to the date of the receiving order.

The debtor, Louis Augustus Mangold, had stated that he started business in 1917 with a borrowed capital of £80. The business showed a fair return for a year or so, and in 1919 his brother Charles joined him. The business increased and continued to be satisfactory until about six weeks ago, when the competition of the German markets seriously affected their trade. Prices were forced down and considerable losses were incurred on the large stocks which they held. As they were unable to obtain further financial assistance they filed their petition. The business had also been handicapped by the fact that it was conducted entirely on borrowed money.

The creditors resolved that Mr. E. H. Hawkins, Incorporated Accountant, of 4, Charterhouse Square, E.C., be appointed trustee of the estate with a committee of inspection.

Scientific Cotton Research

DR. A. W. CROSSLEY, Director of Research at the Shirley Institute, Didsbury, contributes an article on the research carried out there for the cotton industry in the Manchester Chamber of Commerce *Monthly Record*. The elimination of irregularities in the final product requires considerable investigation of various stages in the process, particularly in spinning, sizing, bleaching and calico printing. The Shirley Institute has investigated many of these problems since 1922 when it was opened, particular points of interest being the development of a chemical test to distinguish American and Egyptian cotton, the standardisation of methods to show whether a fabric is incompletely scoured or over-bleached, and the introduction of a device for measuring the wetness of the steam used in the ageing process of calico printing.

German Chemical Outlook

THE ECONOMIC CONDITIONS in the German dye industry have, according to the *Board of Trade Journal*, become very unfavourable. A large number of factories turning out intermediate products and dyestuffs have had to shut down, and others to restrict operations as stocks are overfilled, and an improvement in sales is not to be anticipated in the near future. Employment, therefore, has declined further. There has been no recent change as regards the production of fertilisers.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained.

Opposition to the registration of the following Trade Marks can be lodged up to September 20, 1924.

438,832. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Liverpool Borax Company, Ltd., Old Swan Works, Borax Street, Liverpool, Lancashire, manufacturers. July 7, 1923. (To be Associated. Sect. 24.)

444,499. For a preparation included in Class 1, for preventing rust on metals. British International Industries, Ltd., 44 and 46, Kingsway, London, W.C.2, manufacturing chemists. January 16, 1924. (To be Associated. Sect. 24.)

"SCHELLAN."

445,784. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Kunstharzfabrik Dr. Fritz Pollak, Gesellschaft mit Beschrankter Haftung (a limited company registered under the laws of Austria), 178, Linke Wienzeile, Vienna VI, Austria, manufacturers. February 27, 1924.

"KOPAN."

445,785. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Kunstharzfabrik Dr. Fritz Pollak, Gesellschaft mit Beschrankter Haftung (a limited company registered under the laws of Austria), 178, Linke Wienzeile, Vienna VI, Austria, manufacturers. February 27, 1924.

"NEOHYDRAPHTAL."

446,808. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Chemische Fabrik Pott and Co. (a Kommanditgesellschaft registered under the laws of Germany) (personally responsible partners: Rainer, Pott and Rudolf Sajitz), Priessmitzstrasse 39, Dresden, N., Germany, manufacturers. March 25, 1924.

444,035. For chemical substances used for sanitary purposes, included in Class 2. The United Alkali Co., Ltd., Cunard Building, Water Street, Pier Head, Liverpool, and Greenbank Works, Widnes; alkali manufacturers. January 1, 1924. (To be Associated. Sect. 24.)

"SENNAFOLINE."

449,791. For chemical substances prepared for use in medicine and pharmacy. Society of Chemical Industry in Basle (a joint stock company organised under the laws of the Swiss Republic), 141 to 227, Klybeckstrasse, Basle, Switzerland, manufacturers and merchants. July 1, 1924. (To be Associated. Sect. 24.)

"ANTICALORINE" (CORBYN).

448,923. For a chemical substance prepared in Great Britain for use in medicine and pharmacy. Corbyn, Stacey and Co., Ltd., Hunts Lane, Stratford, London, E.15, manufacturing chemists. June 3, 1924. Registration of this Trade Mark shall give no right to the exclusive use of the word "Corbyn."

"SPRAYMULSE."

447,103. For bituminous emulsions for use in manufactures. Burt, Boulton and Haywood, Ltd., Salisbury House, London Wall, London, E.C.2, merchants and manufacturers. April 2, 1924.

"CELANESE."

449,821. For dyestuffs and preparations for dyeing, included in Class 4. British Celanese, Ltd., 4, Waterloo Place, London, S.W.1, manufacturers. July 2, 1924. (To be Associated. Sect. 24.)

Opposition to the Registration of the following Trade Marks may be lodged up to September 27, 1924.

"SULDURA."

448,735. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. The Yorkshire Dyeware and Chemical Co., Ltd., 27, Kirkstall Road, Leeds, manufacturing chemists. May 28, 1924. (To be Associated. Sect. 24.)

448,736. For raw, or partly prepared, vegetable, animal and mineral substances used in manufactures, not included in other classes. The Yorkshire Dyeware and Chemical Co., Ltd., 27, Kirkstall Road, Leeds, manufacturing chemists. May 28, 1924. (To be Associated. Sect. 24.)

"ENVAROL."

449,779. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. William Gulliver, trading as the Envarcol Company, 89, Dawlish Road, Leyton, London, E.10, varnish and colour merchant. July 1, 1924. (To be Associated. Sect. 24.)

"VERONIX."

449,780. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. William Gulliver, trading as the Envarcol Company, 89, Dawlish Road, Leyton, London, E.10, varnish and colour merchant. July 1, 1924.

"TARCONRODE."

439,180. For tar for use on roads. Consett Iron Company, Ltd., Consett, Durham, iron and steel manufacturers, colliery owners. July 19, 1924.

"INVICTA."

450,338. For raw, or partly prepared, vegetable, animal and mineral substances used in manufactures, not included in other classes, but not including Oleine, and not including any goods of a like kind to Oleine. Thomas Hill-Jones, Ltd., 3, Bow Common Lane, London, E.3, manufacturers. July 18, 1924.

Company News

DOMINION TAR AND CHEMICAL.—Usual interim dividend of 5 per cent., tax free, on ordinary shares, payable September 10.

GOODLASS, WALL AND CO.—Balance after paying preference dividend £42,000. Dividend of 12½ per cent. declared.

B. LAPORTE.—Dividend of 11 per cent., less tax, on ordinary for year; £2,000 to reserve; £1,000 written off goodwill; £2,000 to taxes suspense account; £9,560 forward. Last year, dividend same.

Electric Furnace Firms Co-operate

WE are informed by Automatic and Electrical Furnaces, Ltd., of 173/5, Farringdon Road, London, E.C.1, that in order to meet the increasing demand for large size "Wild-Barfield" patent electric furnaces, with internal heaters, they have made arrangements whereby all such furnaces above 25 kW will in future be designed in conjunction with Electric Furnace Company, Ltd., of 17, Victoria Street, London, S.W.1, and supplied by them. The firm will continue the manufacture and sale of their "Wild-Barfield" automatic hardening furnaces with magnetic detector and internally heated type of furnaces up to 25 kW. Arrangements have also been made with George J. Hagan Co., of Pittsburg, U.S.A., who have constructed a large number of electric resistance furnaces up to 350 kW. capacity, for the use of their drawings and information, so that the best British and American practice will be incorporated in the designs.

Crude Oil From Shale

AN invention, known as the Crozier retort, for extracting crude oil from shale and coal, was demonstrated at the British Empire Exhibition on August 25. The plant exhibited is the second to be built, the first being at work in the oilfields of Burma, where it is reported to have proved successful. The retort at Wembley was built in Burma and transported to Wembley.

Engineers from all countries have come to Wembley to see the retort, one unit of which can deal with 500 tons of shale a day. Mr. R. H. Crozier, the inventor, was present to explain his retort, which dealt with 14 tons of shale. The chief feature of the apparatus in contrast with those used on the low Scottish shale fields is that it deals with the very highest grade of shale and lignite, producing from 50 to 150 gallons per ton.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that occur.

London Gazette, &c.

Companies Winding Up

DAY (E.) AND CO., LTD. (C.W.U., 30/8/24.) First and final dividend, 20s. per £, payable August 26 at the office of the Official Receiver and liquidator, 33, Carey Street, Lincoln's Inn, London, W.C.2.

RYLAND (FRED J.) AND CO., LTD. (C.W.U., 30/8/24.) First meetings, September 4, 33, Carey Street, Lincoln's Inn, London; creditors, 11.30 a.m., and contributories 12 noon.

New Companies Registered

NORMAN W. DUNN AND CO., LTD., 25, High Street, Doncaster. Merchants in coal, coke, lime, limestone, iron ore, slag, etc., and manufacturers of coke and chemical products, coal-tar by-products, cement and road-making materials, etc. Capital, £2,000 in £1 shares. Solicitor: J. S. Clarke, 8, Priory Place, Doncaster.

ECCO RADIO, LTD., Ecco House, Princess Street, Edgware Road, N.W.8. Electrical, chemical, electro-chemical, mechanical, radio and general engineers, etc. Capital, £3,000 in £1 shares.

FRANCIS F. FOX AND CO., LTD. To acquire the business carried on in Bristol as Francis F. Fox and Co., and to carry on business as drysalters, etc., importers and manufacturers of oils, colours, chemicals, etc., and all commodities used, weaving, dyeing, etc. Capital, £50,000 in £1 shares. Solicitors: Bevin, Hancock and Co., 24, Baldwin Street, Bristol.

HEYL'S COLOURS, LTD. Manufacturers of and dealers in oils, colours, chemical and pharmaceutical products, etc. Capital, £15,000 in £1 shares. Solicitors: Crueseman and Rouse, 85, Gracechurch Street, E.C.

NATIONAL ROOFINGS, LTD. Manufacturers and merchants in bitumenised roofing felts and similar products, chemicals, industrial and other preparations, tar, asphalte, petroleum products and vegetable oils, etc. Capital, £10,000 in £1 shares. Solicitors:—Morris, Crisp and Co., 17, Throgmorton Avenue, London, E.C.

PARKER'S OIL CO., LTD., 28a, Manor Road, Bradford. To acquire the business of an oil manufacturer and merchant now carried on at Windhill, Shipley, as "Parker's Oil Co." Capital, £30,000 in £1 shares. Solicitors: Wade, Tetley, Wade and Co., 8, Piccadilly, Bradford.

PYROS CHEMICAL AND ENGINEERING CO., LTD., 59, New Bridge Street, London, E.C.4. For the purchase of certain processes and rights relating to the manufacture of insoluble and non-poisonous white lead, and to carry on business as chemists, oil and colourmen, etc., manufacturers of and dealers in chemical and other preparations and articles, apparatus and materials, engineers, metallurgists, etc. Capital, £2,000 in 1,500 10 per cent. cumulative preference shares of £1 and 10,000 ordinary shares of 1s.

RUSSIAN OIL PRODUCTS, LTD., Moorgate Hall, Moorgate, London, E.C. Brokers, refiners and dealers in petroleum and other mineral oils, natural gas, naphthalene, etc., and the products thereof. Capital, £100,000 in £1 shares. Solicitors: Wynne-Baxter and Keeble, 9, Lawrence Pountney Hill, E.C.

STRATHCLYDE PAINT CO., LTD., 17, Davidson Street, Glasgow. Drysalters, chemists, refiners, extractors, etc., manufacturers, dealers, etc., in any metal or mineral and all products thereof. Capital, £25,000 in 24,800 shares of £1 and 2,000 shares of 2s. each. Solicitors: McGregor Donald and Co.

Recent Wills

Mr. Frederick W. Berk, of Bromley, Kent, and Fenchurch Avenue, E.C., manufacturing chemist £79,067

William Anderson Turner, of Hull, managing director of Messrs. W. T. Owbridge, Ltd., manufacturing chemists £12,669

Mr. John Bouch Willows, J.P., of Langdale Chase, Windermere, Westmorland, a member of the British Oil and Cake Co., Hull £95,522

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

CHEMICALS, OILS, FATS, ETC., FOR NORWAY.—A firm of commission agents in Christiania desires to secure the representation for Norway of British manufacturers of heavy and fine chemicals and all kinds of vegetable and animal fats, oils, etc. (Reference No. 247).

CHEMICALS AND PHARMACEUTICAL PRODUCTS.—A commission agent of Madrid is desirous of securing the representation of a British manufacturer of chemical products and pharmaceutical specialities. (Ref. No. 226.)

INDIARUBBER WARE, GLASS BOTTLES (FOR LABORATORY USE).—A firm established at Amsterdam is desirous of obtaining the representation in The Netherlands of British manufacturers of these goods. Correspondence in English. (Ref. No. 225.)

PUMPING PLANT FOR MADRAS.—Tenders are invited for supply and delivery of sewage pumping machinery consisting of centrifugal pumps driven by oil engines, pipes and accessories, etc., to be provided, erected, set to work and maintained at North Mylapore and Langs Garden pumping stations, Madras. Tenders received by the Commissioner, Corporation of Madras, Ripon Buildings, Madras, up to 12 noon on December 10. Printed forms of tender, with one set of drawings, prepared by the special draining engineer, from the Revenue Officer, Madras.

RAW MATERIALS FOR SOAP MANUFACTURE.—A firm of Warsaw soap manufacturers wishes to communicate with British exporters of raw materials used in soap manufacture. (Reference No. 250).

SEWAGE WORKS.—Tenders are invited for the construction of sewers, manholes, screening tanks, detritus tanks, septic tank, percolation filters, etc., at Burnhope Colliery, Lanchester, for the Lanchester Rural District Council. Plans may be seen and quantities obtained on application to Mr. J. R. Lupton, surveyor, Lanchester. Sealed tenders, endorsed "Burnhope Sewage Works," to be received by Mr. J. J. S. Barker, clerk, Lanchester, Durham, not later than September 2.

SEWAGE WORKS EXTENSION.—Tenders are invited for works of effluent channels, dosing tanks, percolating filters, humus tanks, etc., in connection with extension to eastern sewage works for Woodford Urban District Council. Forms and particulars from Mr. W. Farrington, Council Offices, Woodford Green, Essex, upon deposit of £2 2s., which will be returned upon receipt of a bona fide tender. Sealed tenders, endorsed "Tender for Extensions to E.S.W.," to be delivered by 12 noon on September 1.

TAR, OILS, DISINFECTANTS.—Tenders are invited by Stoke-on-Trent Town Council for supply of refined tar, pitch, creosote oil, paints and oils, soap, soda and disinfectants. Forms from Borough Surveyor, to be returned by September 8.

Tariff Changes

ARGENTINA.—Alcohol, naphtha, kerosene, fuel and gas oils, are included in the lists of new and revised taxes put forward in a recent Bill.

SUDAN.—The Public Health Ordinance, 1924, prohibits, *inter alia*, the importation into, the exportation from, and the manufacture in, the Sudan, of the following drugs or any plants from which such drugs can be extracted:—Cocaine; *cannabis indica* (otherwise known as hashish or kamonga), of all varieties; diamorphine (commonly known as heroin), ecgonine, and morphine, and their respective salts; medicinal opium (*i.e.*, raw opium which has been artificially dried), and any preparation, admixture, extract, or other substance containing not less than one-fifth per cent. of morphine or one-tenth per cent. of cocaine, ecgonine, or diamorphine.